AMERICAN FORESTS

JULY 1942

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American Forests

Editor
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Published monthly by

THE AMERICAN FORESTRY ASSOCIATION

919 Seventeenth Street
Washington, D. C.

The American Forestry Association, founded in 1875, is a citizens' organization for the advancement of intelligent management and use of the country's forests and related resources of soil, water, wildlife and outdoor recreation.

Its educational activities seek to bring about a better appreciation and handling of these resources, whether publicly or privately owned, that they may contribute permanently to the welfare of the nation and its people.

In addition to publication of two magazines — AMERICAN FORESTS and CONSERVATION, both designed to keep before the people of the country important conservation questions and issues, the Association carries on educational programs in various fields including forest fire prevention, reforestation, protection of wildlife, prevention of soil erosion, preservation of wilderness areas, establishment of national forests and parks, advancement of forestry by private endeavor, the teaching of conservation in schools and the promotion of research in timber growing and forest utilization.

The Association is independent and non-commercial, and has no connection with any federal or state governments. All its resources and income are devoted to the advancement of conservation in the interests of public welfare. All citizens are welcomed to membership.

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The story on the organization of Forest Regiments for war service, announced last month to appear in this issue, has been delayed because the War Department is not yet ready to release its plans in respect to these units. Announcement of date of publication will be made later.—Editor.

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Who's Who

Among the Authors in this Issue

Edward J. Fenton

EDWARD J. FENTON (*Plywood Takes to the Skies*) belongs to the literary staff of the American Forest Products Industries, and just now is writing "spot news" from the Washington office. A former New York and Washington newspaper man, he was for two years an assistant to Dr. George Gallup of "poll" fame.

JAMES MACGILLIVRAY (*The Eagles of Oscoda*) spent his boyhood in the twin sawmill towns of Oscoda-Ausable, which in the early eighties led the world in lumber production. Here in this river valley, then the home of the famed Michigan grayling, now so nearly extinct, he came to know wildlife familiarly. He turned eventually to writing and later served as director of the educational division of the Michigan State Department of Conservation. In his hobby of wildlife photography he was coached by the late George Shiras, 3rd. Mr. MacGillivray now lives at Oscoda, and when not working on juvenile nature studies, he is probably skiing through snow-drifted woods, or casting his own fly patterns in season.

James MacGillivray

Stanley Koch

STANLEY H. KOCH (*Remember 1910!*), now an ensign in the U.S.N.R., had been engaged, until the war called him, in public relations work for the Portland Cement Association, at the Atlanta headquarters. He was born in Missoula, Montana, in 1915, and graduated in journalism in 1936 at the University of Montana. The summer vacations of his younger days were all spent in the woods and mountains of Montana and Idaho, where he acquired woods lore and his background of knowledge of the forests of the Northwest.

Harry S. Tillotson

HARRY S. TILLOTSON (*Trappers of the Pine Barrens*), illustrator and writer, was born in Brooklyn, New York. Plant study has been his lifelong interest and has led to much experimentation in non-commercial plant breeding. His fine water colors, in detail, of many curious insectivorous plants, as well as forty native miniature wildflowers, are well known and a work of high scientific value. These pictures were on exhibition in Philadelphia for more than a year.

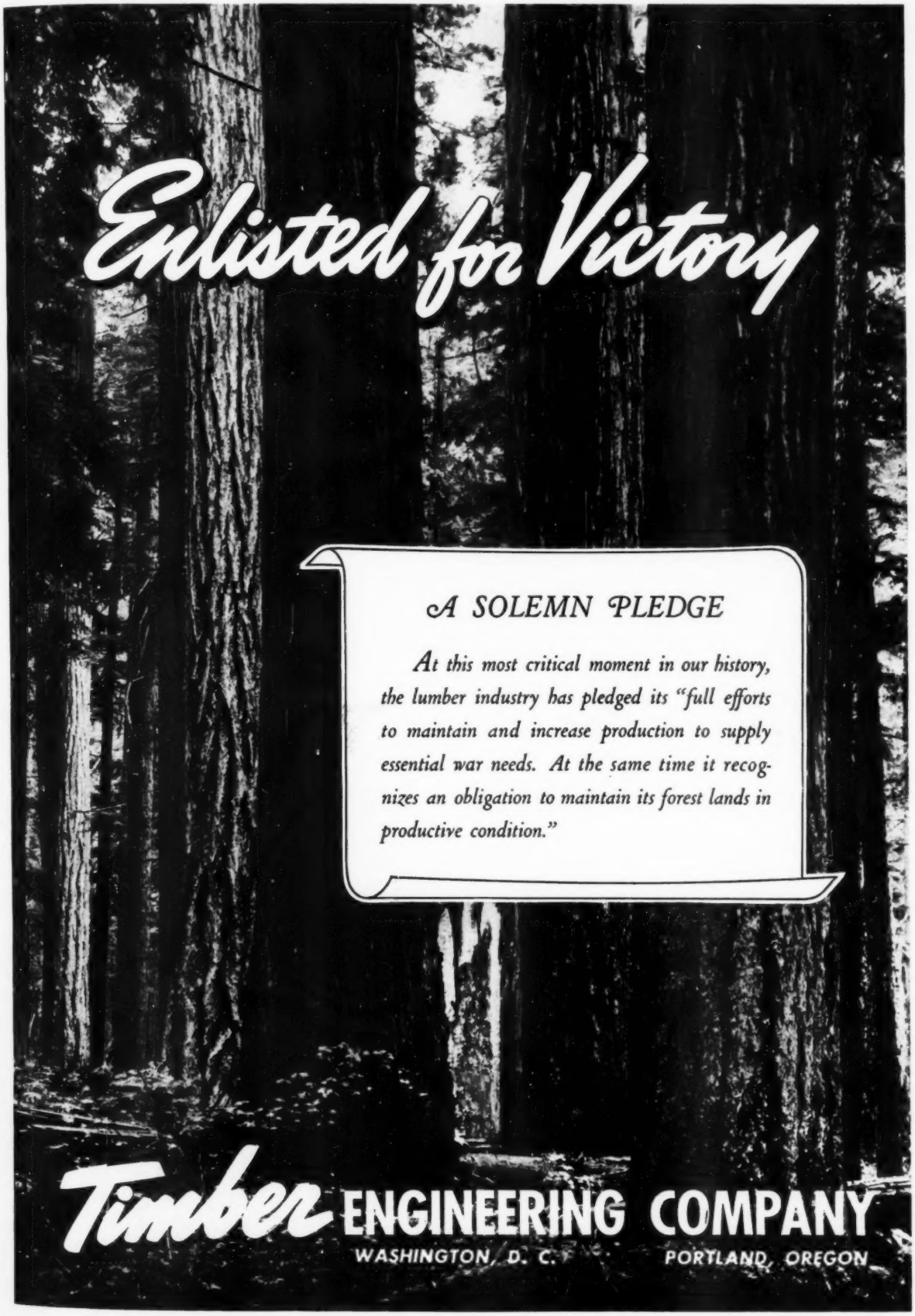
STEWART HOLBROOK (*Paperjacks' College*), whose books "Holy Old Mackinaw" and "Tall Timber" so vividly portrayed the life and work of the American lumberjack, again writes of the big timber, this time of the lumberjacks' cousin, the paperjack. A native of Vermont, his colorful experience in the lumber camps from coast to coast has contributed greatly to the interest and virility of his writings. At the moment he is working on another book and directing the *"Keep Washington Green"* forest fire prevention campaign in the Pacific Northwest.

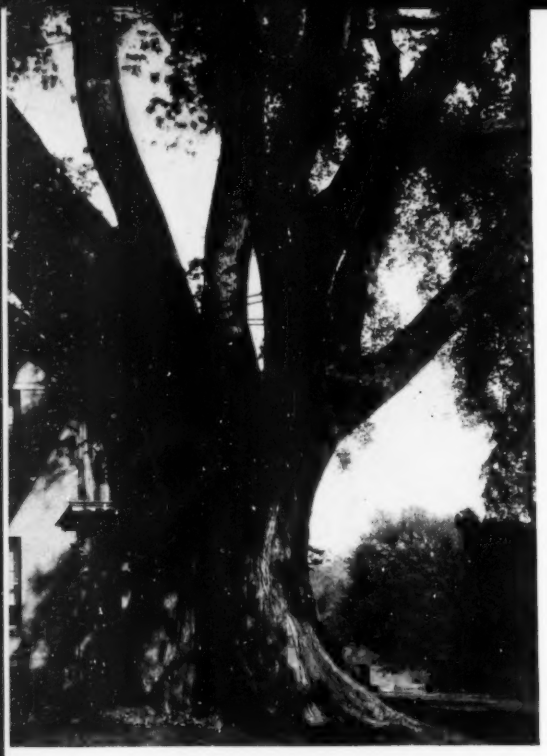
Sigmund Sameth

SIGMUND SAMETH (*New Products from Redwood*), botanical and archaeological explorer and writer, is an anthropologist by profession. His hobbies — photography and vagabonding — furnish rich material for the articles he likes to write for current magazines.

G. H. COLLINGWOOD (*Chestnut Oak*) is associated as Forester with the National Lumber Manufacturers Association at Washington, D. C.

THE COVER—"Freedom Defiant"—Photograph made by James MacGillivray.


Enlisted for Victory
A SOLEMN PLEDGE
At this most critical moment in our history, the lumber industry has pledged its "full efforts to maintain and increase production to supply essential war needs. At the same time it recognizes an obligation to maintain its forest lands in productive condition."
Timber ENGINEERING COMPANY
WASHINGTON, D. C.
PORTLAND, OREGON



The Marietta Elm — Ohio

BIG TREES

The American Forestry Association is sponsoring a national hunt for the discovery and preservation of the largest specimens of the different species of typical American trees. Locate, measure and nominate your candidate in this competition. ACT NOW to make known and save the largest specimens of America's trees. For further details, send for the Association's special announcement of this Big Tree hunt. Mail your nomination with records and pictures to The American Forestry Association, 919 17th Street, Northwest, Washington, D. C.

Giant Elms

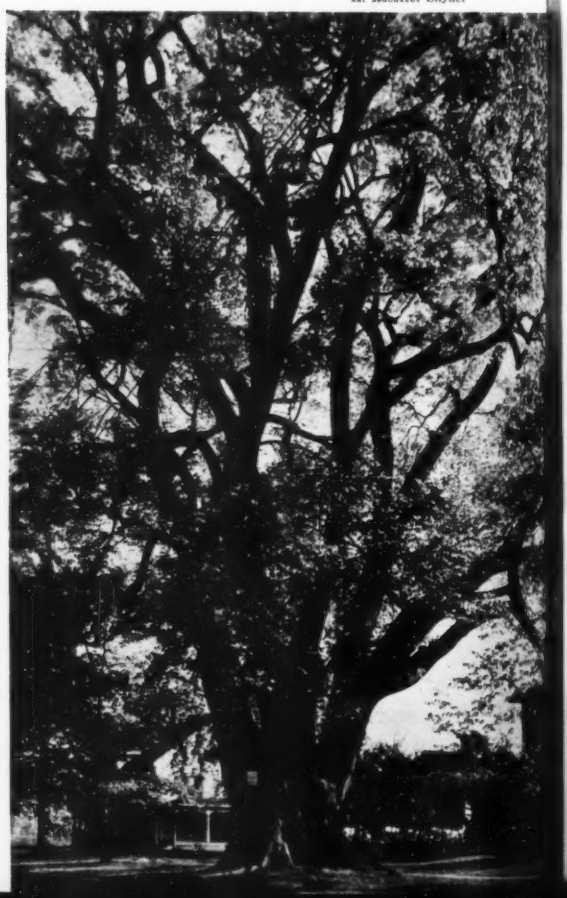
TWO GREAT American, or white, elms, one in Connecticut, the other in Ohio, are so outstanding in size and beauty that both deserve mention in presenting the largest of the species reported to The American Forestry Association.

Of the two trees, the honor of being the largest white elm in the United States goes to the great tree at Wethersfield, Connecticut. This giant, nominated by Austin F. Hawes, state forester of Connecticut, has a circumference of thirty feet three inches at four and a half feet above the ground. It is ninety-seven feet high and has a limb spread of 147 feet. Before the hurricane of 1938, which ripped off several large limbs, it had a spread of 165 feet.

The Ohio tree, known as the Rathbone Elm, is located at Marietta on the property of its nominator, James E. Gavin. This magnificent elm is twenty-eight feet seven inches in circumference, four and a half feet above the ground, ninety-eight and a half feet high, and has a limb spread of 140 feet.

The Wetherstield Elm — Connecticut

H. Rossiter Snyder



FORESTERS are trained to think ahead and to provide in advance for the welfare of mankind. A dramatic example is the case of Lt. Colonel Arthur F. Fischer, long chief of the Philippine Forest Service, one-time Director of Science, and since the establishment of the Philippine Commonwealth, Adviser on Natural Resources. Colonel Fischer recently arrived in Washington after a harrowing escape from Bataan Peninsula. His escape was made possible because he had thought ahead—not in his own interests but in the interests of men of the Allied Nations who must fight the lizard-painted Japs in tropical jungles.

Years ago, deep in the mountains of Mindanao, Forester Fischer began the growing of the Cinchona tree, from the bark of which quinine is derived. His plantations had come to the bark-yielding stage and a quinine extraction plant had been installed at the Bureau of Science, Manila. When the Japs attacked the Philippines and began to infiltrate its coastline, one of Colonel Fischer's first thoughts was of his quinine supply and of how to preserve it for impending contingencies. He knew from twenty-five years of experience in the Islands that a shortage of quinine in jungle fighting could be a more deadly foe than the Japs themselves.

With the fall of Manila, Colonel Fischer's days and nights were charged with other duties, alternating between Bataan and Corregidor. His supply of manufactured quinine stored at the Bureau of Science had been overlooked and lost, but his Cinchona trees on the Island of Mindanao, still uncaptured, contained a supply of quinine bark that might be saved and converted into medicine that would mean life and stamina for thousands of besieged men. He pressed the undertaking and in the course of days, each more desperate than the one before, he, himself, was assigned the task. An old plane carried him secretly to Mindanao, where, under the conditions then prevailing, a herculean task confronted him. It involved not only the gathering of bark but its grinding into powdered form for transportation to points where extraction plants could be hurriedly improvised and camouflaged against Japanese bombings. It involved locating and collecting here, there, and wherever it could be found, a miscellany of materials that could be implemented into grinding and extraction plants—steel drums, corn grinders, power plants, etc. It involved rounding up necessary labor and chemicals essential to the making of quinine extract. Undaunted and with the cooperation of both Philippine and American foresters, Colonel Fischer set himself to the task.

"As it is Sunday," reads a note in his personal diary, which the editor has been privileged to see, "I went into my little cubicle and read the Bible and said a prayer for the boys on Bataan and Corregidor. Hope we can get quinine to them."

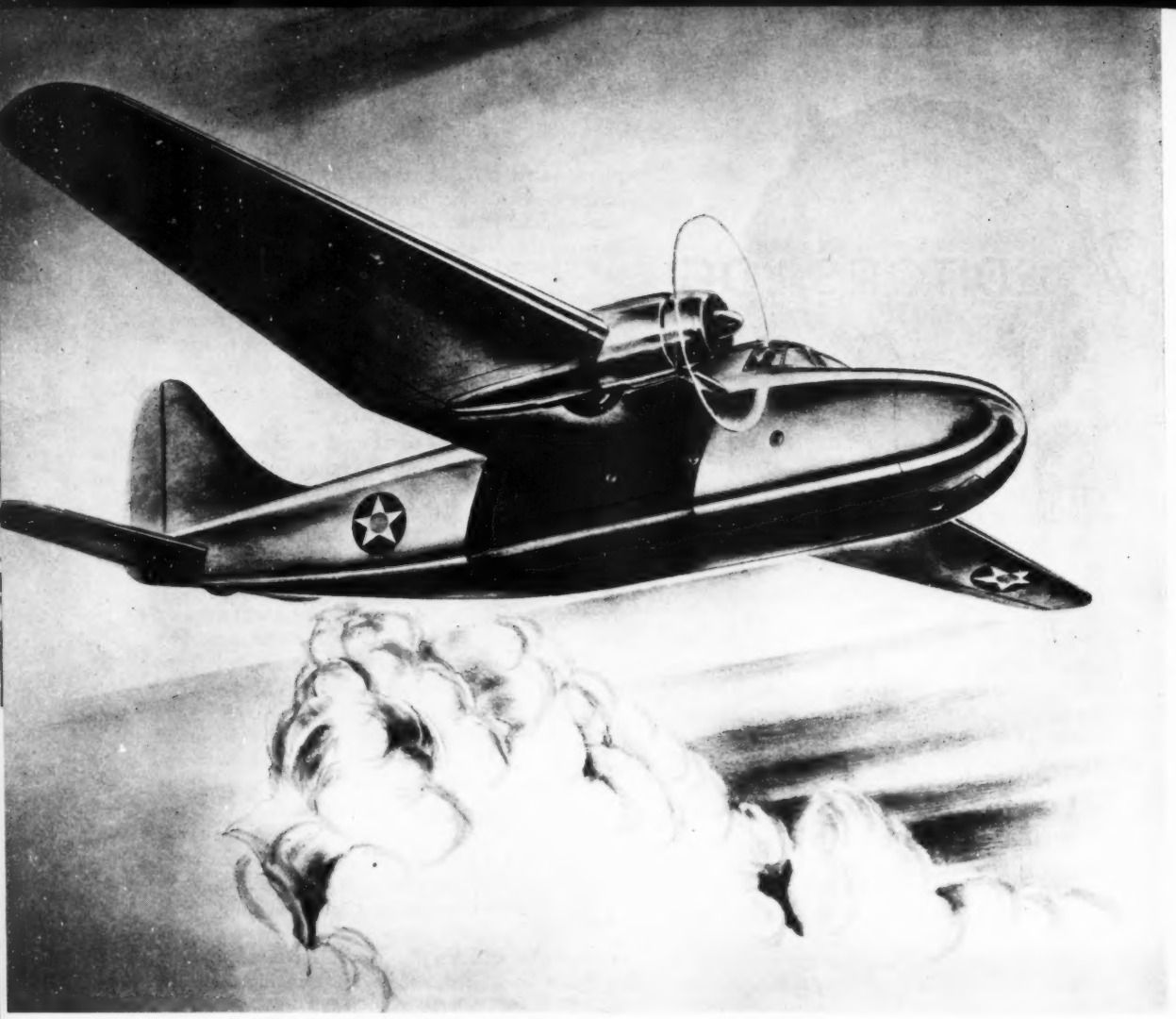
Colonel Fischer had thought of another thing. He had accumulated a supply of seed of the best variety of the Cinchona tree. "If our quinine bark is lost and Java—main source of the world's quinine supply—likewise falls to the Japs," he thought, "these Cinchona seeds will grow quinine trees in other lands. They must be saved for that contingency." As the situation grew more desperate, with malaria striking down increasing numbers of our Bataan defenders, the Army, too, saw the need of saving Colonel Fischer's Cinchona seed and, as it developed later, quietly made plans.

Body-torturing days followed under bomb-raining skies. Added to Colonel Fischer's handicaps was septic poisoning which he had contracted in handling Japanese equipment captured on Bataan Peninsula. The outlook for harvesting the Cinchona bark and manufacturing it into quinine grew darker and more hopeless as the Japs intensified their attacks upon the Island. Suddenly one night word came to Colonel Fischer that a secret plane had been fitted up and was to leave within a few hours for Australia. A place had been provided for him and his Cinchona seed.

Morning saw them dodging Jap bombers out over the bay, but they reached Australia safely. Days of fever followed for Colonel Fischer. When these were over he was provided passage on a ship to America. With him came his Cinchona seed. Arriving in Washington, he delivered them to the Department of Agriculture and plans are now being made to plant them in South America.

History takes queer turns. Three hundred years ago in Peru quinine was first given to the world when the Corregidor of Loja saved the life of the Count of Chinchon with a strange Indian concoction made from the bark of a beautiful tree. This tree, since known as the Cinchona, has been so exploited in South America that its seed today is preciously valuable for its perpetuation. Forester Fischer's forethought and his precarious journey, starting from Corregidor in the Philippines, has in some measure at least repaid the white man's debt to the land of its nativity and to the worthy Corregidor of Loja.

Ovid Butler



Curtiss Wright Corporation

The most dramatic illustration of the part wood will play in the war in the air is the new giant Curtiss military cargo transport ship, shown in the sketch above. Built of resin-bonded plywood and other non-strategic materials, this mighty plane will have a wingspread approximately thirty feet greater than the average commercial sky-liner. Its construction will utilize a relatively untapped reservoir of skill—wood-working. Craftsmen at furniture plants, piano and organ factories, and other establishments where products are made from wood, will turn out fuselages, wings, tails and elevators

PLYWOOD TAKES TO THE SKIES

By
EDWARD J. FENTON

IN a war which many experts agree will be won largely through air power, wood is once more coming into its own as an aircraft material. It's coming back in a different form—resin-bonded plywood—but it's still a product of American forests.

During World War I, gallant American youths roared over No Man's Land in fabric-covered wood planes. They gambled their lives then on the staunchness of Northwestern spruce, fashioned by craftsmen skilled in working with wood.

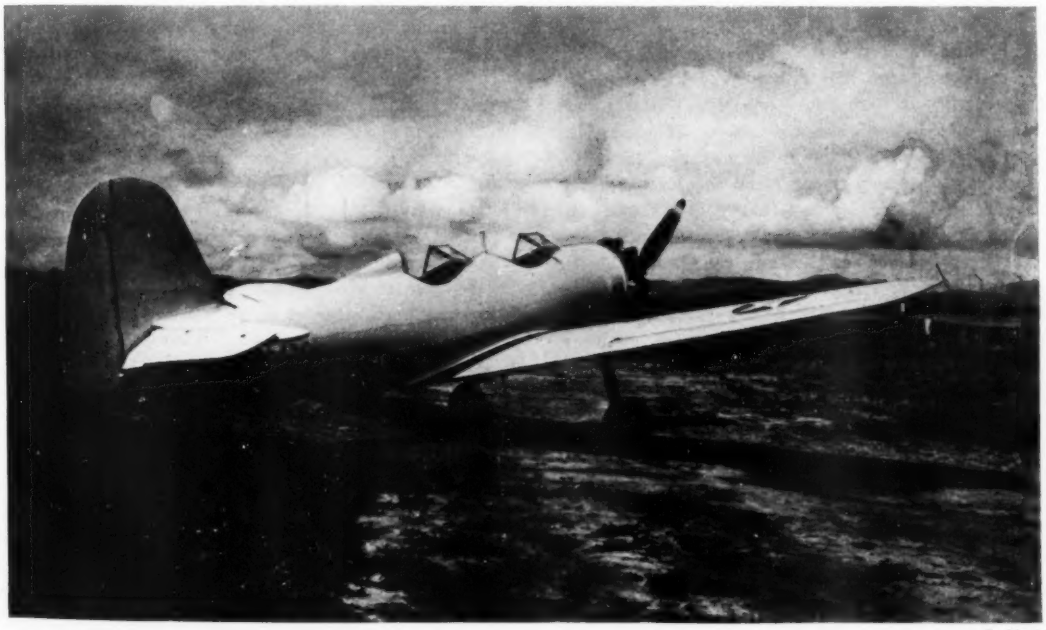
During the thirties, after the first big planes had been successfully constructed from metal, wood was gradually abandoned for aircraft use. Aeronautical engineers, eager to follow what they believed to be the trend, thought in terms of the newly-developed Dural. And planes of duralumin—a copper-bearing aluminum alloy—became the rule.

Came the present war and Hitler's practical demonstration of the efficiency of aircraft used in mass. Britain rushed to build more planes and the United States increased her aircraft production to become the arsenal of democracy. But both nations specialized in metal aircraft, though England made trainers of wood.

But meanwhile there had been made a discovery which is already revolutionizing the aircraft industry—and may well revolutionize many another industry as well. The discovery was that synthetic resins, made chiefly from phenol-formaldehydes, made it possible to form a new and tough plywood which made an ideal aircraft material.

Nearly a dozen plywood airplanes—and Army and Navy censorship may cloak the existence of others—have already taken successfully to the air, but the most dramatic illustration of the part plywood will play in the war in the air is a ship that's still not constructed.

It's a ship designed by Curtiss-Wright to serve as an Army troop and supply transport. Designed to be powered by twin engines, the plane will have



Buckingham

To what extent the Army and Navy are considering the use of plywood in combat craft is a war secret. This low-wing plywood Timm monoplane is primarily a trainer

approximately a 100-foot wingspread. That's about thirty feet more than the average commercial skyliner!

Another feature of the plane is that its construction will take advantage of the skills of craftsmen who have until now been employed at furniture plants, piano and organ factories, and other establishments where products are made from wood. In fact, the parts of the plane itself will be made at these same factories, with some constructing fuselages, others wings, others tails and elevators. The ship will be assembled elsewhere.

So, besides conserving critical materials, the Curtiss-Wright transport will also rely upon a relatively untapped reservoir of skill, — woodworking. Metalworkers, of course, have long since been absorbed in the rush of arms production.

The Army refuses to release other details of this giant craft other than to say that it is intended to carry men and supplies to distant combat areas with the speed modern warfare demands.

To what extent the Army and Navy are considering the use of plywood in combat craft is a war secret. But in announcing that a low-wing plywood monoplane trainer built by the Timm Aircraft Corporation was undergoing tests at Anacostia, the Navy pointed out that bullets striking plywood make clean holes, instead of "flowering" as they do when they strike metal. Of course, this might indicate that the Navy expects its training planes to be shot at.

At any rate, the Italians are said to have four types of bombers made entirely or almost entirely of plywood and the Russians are said to use a fighter with a plywood tail and a wing made largely of the same material.

The British refuse to confirm rumors that they are developing an all-plywood combat ship but they admit that they have three types of plywood training planes in widespread use. They are the Airspeed Oxford, a twin-engine job; the Miles Magister, an elementary trainer; and the Miles Master, the last ship flown by an embryo pilot before he goes on duty with a Hurricane or Spitfire squadron.

Particularly enthusiastic are the British about the Miles Master II, which they say is "nearly as fast as the earlier model Hurricanes." The ship has a speed in the neighborhood of 300 miles per hour.

Apparently the United States armed forces at present intend to use plywood craft chiefly for training purposes. The enormous number of such planes necessary becomes apparent when it is considered that the thousands of fighting craft being turned out for our air forces will necessitate thousands of new pilots. These pilots must have training planes in which to learn their trade.

All-plywood planes which already have been flown successfully include the Duramold-Clark—which won CAA recognition in 1938—the Langley, the Morrow, the Timm, the Vidal-Summit, the Culver Cadet, the Fletcher, the Globe and the Beech. About many of these, particularly those of most recent construction, there is an aura of military secrecy. But there's one thing sure—they all can be used for training planes. The Beech, in fact, is a two-engine job suitable for advanced students.

Now let's see what's responsible for this comparatively sudden recognition of plywood as a first-class aircraft material, a material strong enough to stand the stresses of high-speed twists and turns.

Airplanes, of course, must be built of a material that is both light and strong. And wood, as engineers have always known, is tremendously strong for its weight. Spruce, for instance, is stronger ounce for ounce than high-tensile steel.

Wood has other advantages that make it suitable for aircraft. For one thing, it is a poor conductor of heat and sound and thus will absorb vibration but will not "ice-up." And wood is a material that's easily worked and it is plentiful.

There are disadvantages, though, to ordinary wood for aircraft use. Because of the way its cells are arranged in longitudinal grains, it is stronger parallel to the grain than normal to it. Its strength is also affected by its moisture content, variation of which may change its dimensions and thus make it unsuitable for high-precision work. Its strength, in other words, cannot be controlled.

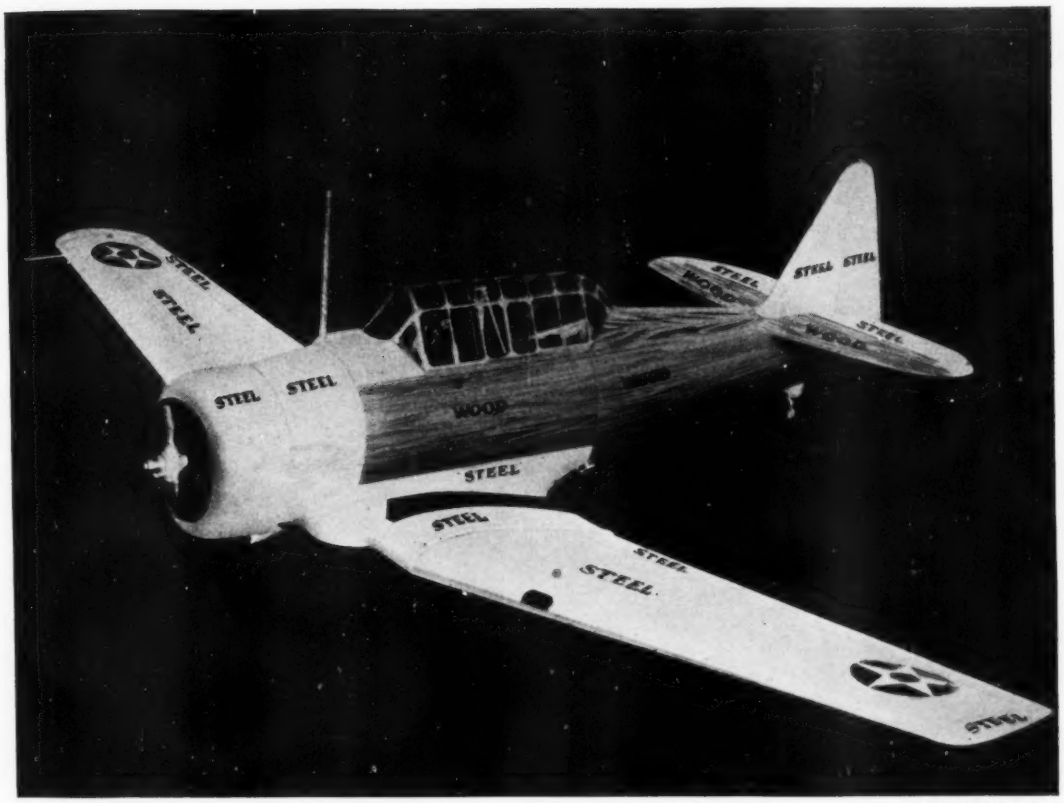
For many years, engineers knew that these disadvantages of ordinary wood were not present in plywood, which is formed by gluing thin strips in layers with the grain of each layer at right angles to the next.

That is, they knew those disadvantages would not be present if there was any way of holding the strips together satisfactorily. The strength along the grain, of course, would be cut slightly but wood's cross-grain weakness would be eliminated. However, there didn't seem to be any glue which would hold the strips together for keeps.

Then a few years ago synthetic resins came into the picture. These, it was found, did the job perfectly. Once set, they stayed set. In fact, strength tests showed that the synthetic resin glue—known technically as a "bonding agent"—was as strong as the wood itself.

Several methods were devised for setting the bonding agent and for molding the plywood into desired shapes. In one typical process, thin laminations are built up on a form and spread with the resin. Then form and resin-glued plywood are placed in an airtight rubber bag equipped with a valve. Air is exhausted from the bag so that it presses tightly against the enclosed material. Then bag and contents are placed in a tank and subjected to steam pressure and heat until the bonding agent has set.

There is another method now coming into use which at least one company claims is superior. In this, high-frequency electric waves are thrown through the plywood, not heating it directly, but activating the molecules within it, causing them to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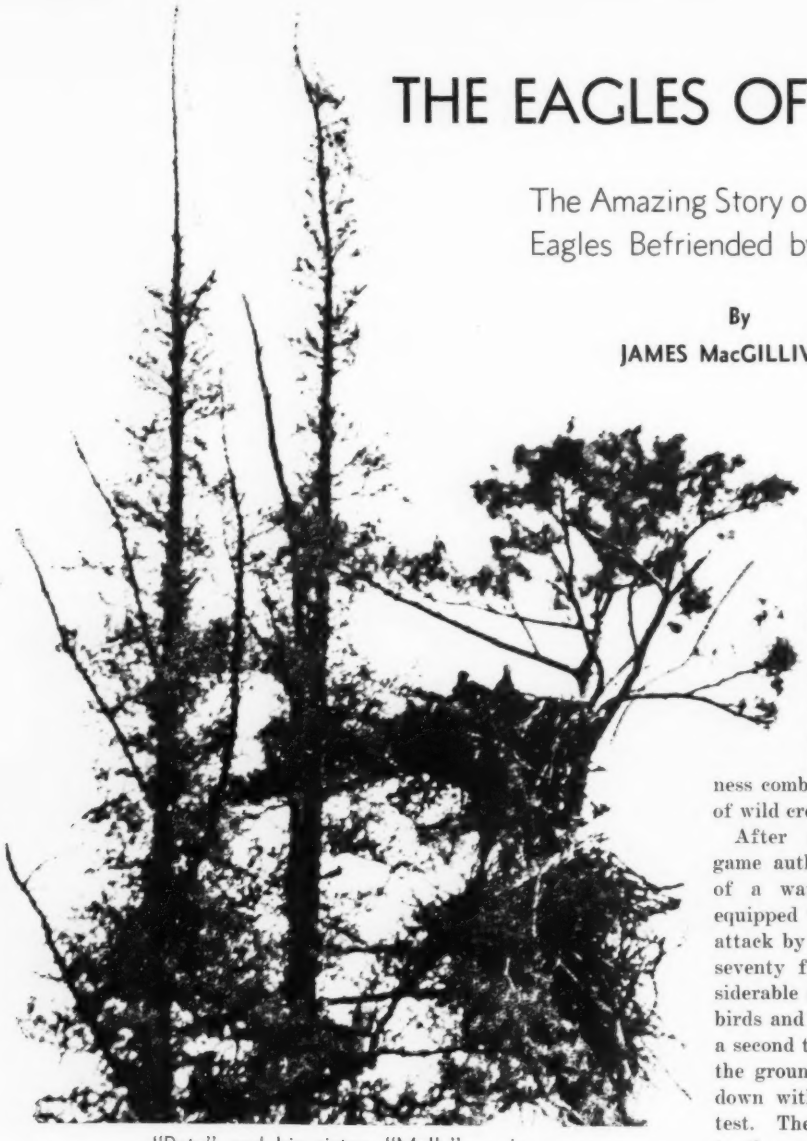
THE EAGLES OF OSCODA

The Amazing Story of Two Bald Eagles Befriended by Children

By
JAMES MacGILLIVRAY



"Pete" and his sister, "Molly" — in knobby silhouette, before being taken from the nest high in the "eagle" tree

WE FOUND the "eagle" tree where the forest converged with the shore line of Lake Huron, near the old Michigan lumbering town of Oscoda. It was a tall red pine, and the double nest in its highest crotch was braced by large sticks, like tepee poles inverted. And there, in the early days of April, we saw two American, or bald, eaglets in knobby silhouette above the aerie bed rim.

Being intensely interested in nature study, we—and this included James, five years old, Jean, six, and Margaret, seven—felt justified in our desire to secure these young birds for convenient observation. We did not realize then, of course, that this was to lead to one of the most astonishing episodes in the annals of wildlife. We could not foresee that these youngsters, both bird and human, were to develop a fellowship rivaling many "stranger than fiction" stories. But that is exactly what happened. And in its happening, human kindness combined with the faith and trust of wild creatures to play the major role.

After making arrangements with game authorities, and in the presence of a warden, two agile schoolboys, equipped with small arms to withstand attack by the parent eagles, scaled the seventy feet to the nest. With considerable effort they secured the young birds and descended. But there wasn't a second to spare. Just as they reached the ground the parent eagles swooped down with terrifying screams of protest. The only damage, however, was to the warden's spaniel, which lost a hank of hide and hair. Curiously, we adults were more perturbed than the children. Perhaps it was this lack of fear which made possible their amazing adventures with the birds in the days to follow.

Transported to our home, "Pete," so christened by the children on the way, weighed a scant five pounds, "Molly" eighteen ounces more. The downy birds were now, we guessed, about four weeks old.

Our first thought was to place the eaglets in confinement, but considering the nature of our observations and the pictures we hoped to make, it was finally decided to set them down in our back yard *sans* cage or pen. We agreed not to restrict their freedom in any manner unless for protection from a chance enemy. When they had learned to fly, we said, they would be permitted to leave if they de-

sired. So in a setting of orchard trees, flowers and clover-spotted grass, the wild children were placed in care of the tame children.

Friendship developed rapidly. After their reserve had been conquered, the eaglets would utter querying cries, as if to ask the children what was next on the program. When mealtime brought them silvery herring or trout, they would prance around in ecstasy. They would even join in games the children planned, dancing around in joyous abandon. This unusual performance attracted many townsfolk, who looked on in amazement. And imagine a bald eagle purring like a kitten! Both Pete and Molly indulged in the same murmur of pleasure that a cat gives when contented, but the sound in phonetic precision was *ung-ung-ung*. Banqueting often invoked this song, and the children's mimicry at times would induce the birds to start the eroon between meals.

Naturally, the children were proud of their eagle chums. They were proud of their majestic bearing, distinctive even in their awkward adolescence, proud of the exquisite fluff of feathered lace which adorned their stalwart legs. They were proud of the intricate adaption of strut and tendon of their wonder wings, proud even of the awesome talons which their straining fingers could not span. Above all, they were proud of the trust and confidence these great wild things had given them.

The eagles had been in the yard five weeks when we first observed their regurgitation stunt. Pete's body would whirl as though he were obeying a mandate to chase himself. He would then stop, pose in an attitude of apprehensive uncertainty, and abruptly his body would convulse and his spreading legs grow rigid. Laboring contortions of breast and neck would follow, as from gaping beak came a brownish green sack that may have weighed an ounce. It had the appearance of silken fabric, with a fine burlap weave. When the conjured sack had dried, the tap of a stick disclosed its contents as bone and cartilage which Pete's craw had apparently deemed unfit for further transit in digestive process.

To give Pete extra practice, the children roguishly stored nails and marbles, even a small penknife, in the half-pound herring fed him. Three hours later they would salvage the articles from the east sack of indigestibles.

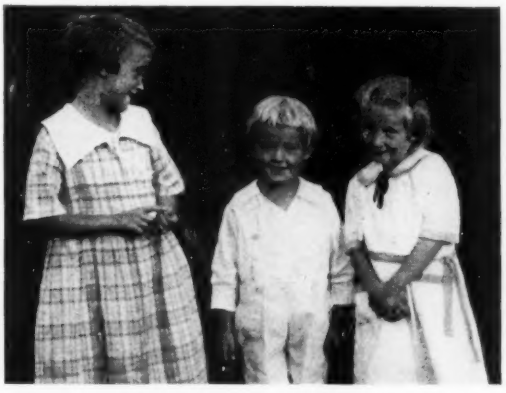
When school was out and summer vacation began, the children devoted hours daily to tutoring the birds. Molly was patiently coached for her role as standardbearer of the Stars and Stripes, a role she seemed to enjoy. Plucking the short staff from the ground, she would slip it under her wing and march proudly around with flag fluttering. Perhaps she sensed an emblematic grandeur in the act—or was it that luncheon would be her reward?

With what the children termed a proper spirit of patriotism, the birds selected July 4 for their first flight trials. Running along the ground with increasing speed, like an airplane on its take-off, they would, with a ridiculous mingling of grace and awkwardness, essay to rise. This made good comedy for the children who coached their endeavors.

Pete was the first to learn to fly, and within a week both birds could wing short distances with grace and ease. Molly would fly again and again into the swift spray of a garden hose, then preen and primp while Pete took his turn at the shower. They would always wash after meals, then rub and polish the talons that had held their food until they were immaculate.

It was evident now that the birds regarded the children not only as playmates, but as guardians. They appeared to rely on them for food and care in the same way they would have depended upon their parents had the regular tenor of their lives gone undisturbed. In return, the birds seemed to consider it their duty to learn to do well those things which a livelihood would require when they were matured and, in a state of nature, no longer supplied by dole. They would hunt lesser birds, squirrels and other

"Pete"



Margaret, James and Jean

"Molly"

James, the tutor, gives a lesson. Molly marches proudly to the flag, and then parades off down the field with fluttering colors!

rodents, capture them, and sometimes enact the kill, only to release them unharmed and return to their back yard menu.

On one occasion Pete's long absence from the yard sent Jean searching on a nearby swale. There she found him in circling pursuit of a young blue heron. As she watched, she surmised that the eagle was simply practicing for future deeds and did not intend to catch and kill his prey. She surmised also that the heron knew the eagle was practicing, that it was indulging in a bit of training itself for more serious days to come.

Another time on the swale, Jim discovered Molly stalking a bittern by cunning artifice. Spreading her dark wings in a humpy shroud, she slowly revolved along like an animated tree stump. When he called to her, she dropped the pose and screamed at him in evident protest that he had disclosed her ruse.

Molly made one killing in sight of the children, the victim being a neighbor's prowling cat. The big Maltese had demolished a nest of chipping sparrows in a lilac bush, eating one of the young, when the eagle catapulted from her fence perch and struck the marauder. High up went Molly with the contorted victim which she dropped above a concrete pavement. The children felt sure that the cat was dead even before its fall.

Jury and executioner, Molly appeared the embodiment of righteous justice. However, three days later when, in a house clean-up, English sparrow nests were removed from porch nooks, she nosed the collected baby sparrows in epicurean speculation, then ate a dozen as chickens take down corn. Unwonted activity in her craw worried her, and she surveyed her wriggling front with ludicrous concern until the agitation ceased.

When the eagles had grown into great fierce birds with six foot wingspread, they flew sky-high on long journeys. Identified by safety ribbons tied around their necks, they were now obtaining some of their food away from home. Seldom, however, did they fail to appear in the back yard for their evening meal. The special band of red silk which proclaimed Pete to be a special sort of eagle was to him a prideful possession. On the other hand, Molly, who often returned minus her ribbon, ap-

The great, fierce bird spreads his tremendous wings at the water's edge

peared to regard it as detracting from her dignity. Sometimes it would be no more than tied when a clever manipulation of her deft talons would undo a series of knots and the token would be discarded.

Pete's love of the ornate got him into many scrapes which we were called upon to adjust. No local clothes line with highly colored trimmings or lacy garments in its washday alignment was safe from his pilferings. Gaudy bathing caps and red and blue binding braids were trophies of his raids with which he adorned his yard perch. Once he brought an old-fashioned, one-piece suit in its red entirety, and the good lady to whom it was returned commended Pete for knowing real flannels when he saw them. This tolerance for Pete's depredations was quite general. Indeed, some of the community matrons exploited his plundering visits to their yards as a social distinction.

They remained discreetly aloof, however, when invited to participate in a stunt the children had improvised. The youngsters would draw a willow withe through Molly's beak and watch it be snipped into segments. Then they would substitute their delicate fingers for the willow, to have them fondled as they were when entrusted to the big white teeth of their pet dog.

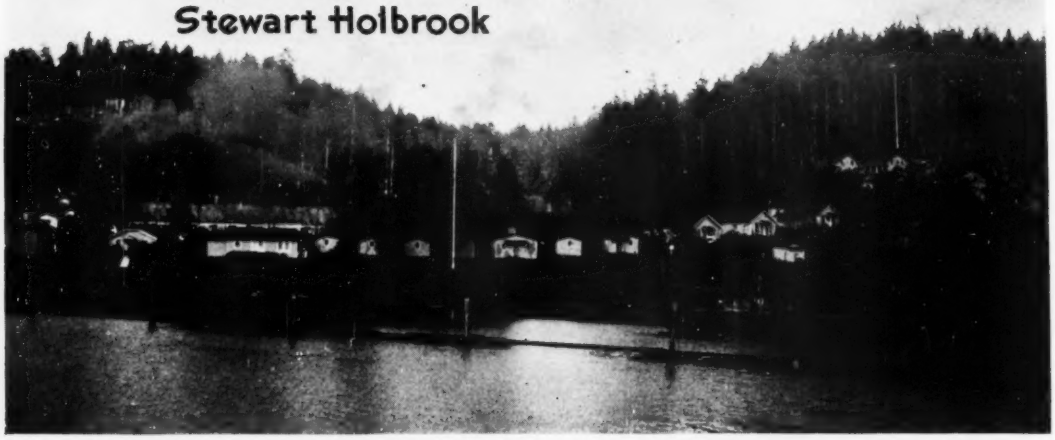
It is not known how Pete met Black Bess, but we were witness to the persistent admiration bestowed upon him by this neighborhood tame crow. Everywhere within a (*Continuing on page* 335)

But a few moments later, gentled, — they are grouped with the children at play

PAPERJACKS' COLLEGE

by

Stewart Holbrook



In this picturesque setting in the big timber of Oregon is Camas Paper College where students —employees of the Crown Willamette Paper Company—learn things not found in textbooks

ONE night recently I traveled twenty-five miles up the Columbia River from Portland, Oregon, to attend a class in what is perhaps the most unusual college in North America. Switch engines were grunting through the campus, pulling cars loaded with gray lime and other chemicals in bulk. In sight of the classroom men with pikepoles, working under floodlamps, pushed big logs through the black waters of the river. Beyond the log booms a sternwheel steamer snorted. Less than half a mile from the classroom began the great forest which stretches to the top of the towering Cascade Range.

The college is the Camas Paper School at Camas, Washington, almost in the exact center of the biggest stand of big timber on the face of the earth. It charges no tuition. There are no book or laboratory fees. Members of the faculty receive no salaries for their teaching. There are no football or baseball teams, no rowing crew. Its fraternities include the pulp and paper unions to which many of the students belong. They are paperjacks, and paperjills, these students, first blood-cousins of Paul Bunyan's lumberjacks.

Camas Paper School is not just another vocational school. It began humbly as such nine years ago, but in 1941 it was granted full university-credit recognition by two of the top-rank forestry schools in the United States, those of the University of Washington and University of Oregon, and its graduates have long since enjoyed a high standing at technical and scientific schools in Sweden, Norway, Finland and England. Stiff courses, unusually fine instruction, and one of the most efficient and elaborate college plants imaginable are what have put Camas head and shoulders above vocational school status.

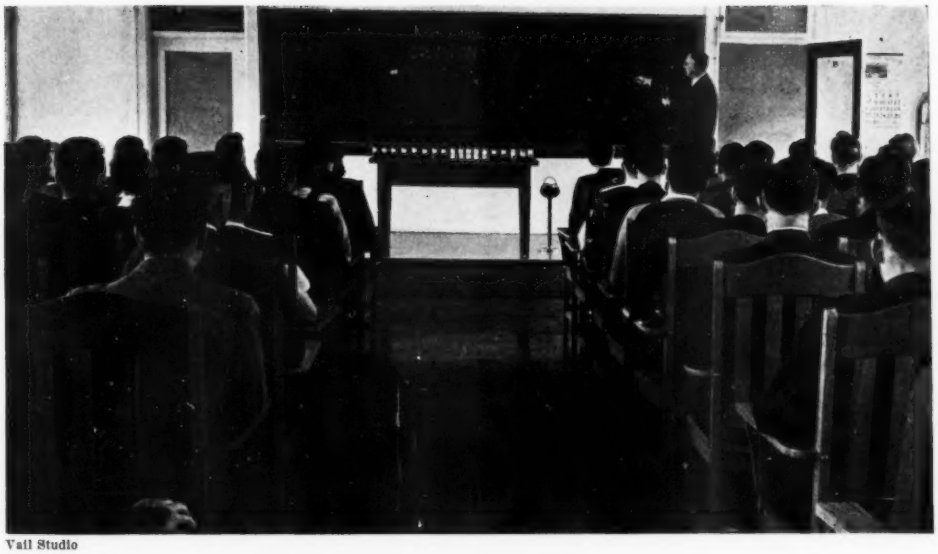
All students as well as the faculty at Camas are employees of the Crown Willamette Paper Company, which employs 2,300 men and women in the largest specialty paper making plant in the world. Enrollment is voluntary, but attendance requirements are very strict and a student who does not comply is quickly dropped.

A large classroom near the plant is used for lectures by fifteen resident professors and by thirty-odd visiting technicians and scientists. The rest of the college ranges over hundreds of acres of mill and laboratory space that comprise the company's plant and research division; it ranges over the vast yards and warehouses, to the gigantic reservoirs and filtering tanks, to the clear lakes where the mill water comes from, and on into the almost endless forest whence comes the spruce and fir and hemlock.

It isn't every college where a student may start his day by considering the formula $2Ca(OH)_2 + 2Cl_2 = CA(OCl)_2 + CaCl_2 + 2H_2O$) in a superbly equipped laboratory, and at an afternoon session flush a flock of wild pigeons from the bush and watch a black bear stroll the length of a wind-felled Douglas fir.

The making of paper is sometimes an art, often a science. Camas School covers the entire field—including its history from remote Chinese and Egyptian eras—from the logging woods to the finished product and even beyond, for its fourth-year students get a course in printing.

I trailed along as the second-year class was taken on a tour of the plant. Making paper, it seems, is



Vail Studio

At Camas, school for the paperjacks—and the paperjills—begins in a large classroom and ranges over hundreds of acres of mill and laboratory space, over vast yards and warehouses, to gigantic reservoirs and filtering tanks, and on into the forest whence comes the spruce and fir and hemlock. There are fifteen resident professors—many visiting technicians and scientists. The entire field of paper making is covered. Four-year students, such as this graduating group shown below, even get a course in printing.

basically the process of separating the fibers of wood, softening and bleaching them, then pressing them into sheets. Chemistry, mechanics and considerable art are involved. Making colored paper calls for an eye as keen for shades as that of the artist in oils. In every division of the great plant the class had each separate process explained by a real master, and under their eyes could see the actual workings of technology.

Take bleaching, for instance. We learned that bleaching is done not only to lighten the color of the pulp and thus of the paper. Bleaching also must incorporate, or at least leave unimpaired in the pulp, particular properties for particular kinds of paper. Different bleaching materials eliminate different properties that are not wanted and retain others that are necessary for this or that paper.

We saw the chipping mill, where logs are reduced to small chips; then the three big digestors where the chips are made into pulp by the three different chemical processes—the sulphate, the sulphite and the soda. In still another part of the mill wood was being made into pulp mechanically, by pressing it against grinding stones.

Everywhere there was water, flowing through flumes, pipes, tanks and evaporators. Mixed with the chemically treated water was pulp, a thin brew at first, then thickening and whitening, then thinning again, going on and on, seemingly endless, like the flow of the great Columbia past the mill walls; passing through machines that worked noiselessly, through machines that made plenty of racket, and so on in one unbroken stream to the fourdrinier machine which turns the wet, sticky fluid into its first resemblance to paper.

From the fourdrinier we followed the process to the press rolls, from which the substance emerges as a kind of paper felt, and then to the smoothing rolls, the dryer rolls, the calender rolls, and lastly to the winding rolls—real paper now.

Somebody remarked on the great amount of water used in making paper out of pulp. The instructor told us that the Camas plant uses 58,000,000 gallons of water every twenty-four hours. It must be filtered and chemically treated in order to remove all dirt and organic matter. For bleached papers, the water used must be practically sterile.

The heart of a paper plant is the control room and here we stopped for some time. It is really a large laboratory, filled with machines to tear, pull, warp, fold and crumple samples of paper in process of manufacture. The finest micrometers measure its thickness. Opacimeters determine its light resistance. Porosity testers show its absorbent quality. All tests are made in a room where the temperature is kept at seventy degrees and relative humidity at sixty degrees, the same conditions applying in each of the seven small testing stations elsewhere in the Camas mill and also in every other paper mill testing station in the United States and Canada.

Every roll of paper is subjected constantly to tests during its actual manufacture. If it does not continue to meet the chemical and physical specifications laid down in the order, the process is stopped at once and changes are made in the paper substance. Then the tests are renewed. It is very much like the testing of steel during the time it is cooking in the open hearth furnace.

Bleaching the raw pulp, screening it, and also its beating and refining, all must undergo the same continuous testing. Likewise in the waxed paper division, where the spraying of wax and lacquer is constantly under scientific observation and control.

From the control room we went on to see what was being made of 3,000,000 miles of rolled paper. At one long row of machines women were forming heavy paper into market shopping bags and stapling on the handles. At other machines they were bundling brightly colored paper napkins, to match the Mexican tableware so popular of late. Others were operating machines cutting and bundling tissue for wrapping citrus and other fruit. In one division only bags of varying sizes were being made.

"Bags are not just bags," the instructor told us. "Every job calls for a different technique. Making paper to be used for raisin bags, for instance, calls for a different bleaching and rolling process than for banana bags. Containers for arsenate of lead, for cement, for poultry feed each requires a different treatment of wood fibers."

Another room gave us some idea of the enormous demands for soft tissue papers. A long battery of machines was folding and packaging face tissues faster than the eye could follow. Light pink and light green were the favored colors that day. One remarkable machine was taking sixteen-foot-long rolls of toilet tissue, wrapping them, then cutting them into the conventionally sized rolls.

We visited the company's main laboratory, a separate building equipped for every piece of pulp and paper research that the industry has been able to think up. In it a staff of sixty-five men and women work under W. A. Barber, chief technician, doing research not only for the Camas plant but for all other plants of the company, which range from upstate New York to Texas, up into Oregon and Washington, and on to Ocean Falls, British Columbia.

Mr. Barber has the happy quality, not too common among technicians, of making complicated matters seem simple, or at least understandable, to the layman. He told us that the basic idea of pulp and paper research, as he saw it, was to enable the manufacturer to shape a very few sources of fiber material (wood) into an enormously wide diversification of paper. He mentioned the fact that in the Camas mill alone no less than 1,500 grades of paper, each with its rigid specifications, are made, and they appear in 500 different shadings of color.

To indicate the need for constant research, Mr. Barber cited a comparatively recent problem which has been solved: With the advent and widespread

use of refrigerated showcases, the old-fashioned butcher paper wouldn't do. It left stains on the meat. By modification of the sizing, or "meat-juice resistance property," as Mr. Barber put it, a paper was fashioned that fills the need. No stains on meat any more.

A number of researchers, some of them Camas Paper School students, were at work on a number of questions Uncle Sam wants answers to. They were not to be discussed. We were told, though, that should shortages appear, edible sugar can readily be produced at pulp and paper mills. So can flavoring, vegetable shortening, various syrups, and

School at the beginning of the school year was 300, but this number has been reduced to 266 through enlistments in the armed forces.

Just as much needed in this kind of a war are technicians of all kinds. At graduation exercises last March, Camas Paper School turned out another large class of four-year, high-ranking and competent technicians. There is plenty of work for them to do.

Conservation of food is the big item right now. The use of community storage lockers, which has grown as fast as lockers can be built this past year, calls for a special kind of waxed and treated paper.

Proof of promise for the future is found in this mixed stand of second-growth timber, — evidence of the reforestation program of this company. A study of one of these many stands of future forests is included in the field work of the Camas students

ethyl alcohol. Blankets, shoes, clothing, canteens, storage tanks, and some of the softest washable wash cloths, pillow slips and bed sheets you ever saw have been made from wood pulp. All can be produced in mass production if need arises; there is no theory about it. In fact, since knowledge and understanding of the properties of cellulose and lignin—the main components of wood—have spread, there would seem to be no end to the things that can be fashioned from forest products. War economy is likely to bring many of them to the fore, and soon.

Back in the classroom we listened while soft-spoken A. G. Natwick, dean of Camas Paper School, discussed the part paper products have come to play in war. He said the Camas plant is operating four six-hour shifts seven days a week and that almost forty per cent of its output was going for the needs of war. Incidentally, enrollment at the Camas

This paper is constantly being improved but is still short of perfection. Uncle Sam needs it in huge amounts for food storage purposes.

And did you know that the mould of citrus fruits works from the inside out? It does, and technicians at Camas are making elaborate tests with a chemically treated tissue wrapper to stop this inside mould by a sort of "X-ray process" emanating from the wrapper. Pears are something else. The mould on pears starts on the skin, the surface, and works toward the core. We were shown and told about a new kind of wrapper, devised by Camas technicians, which is treated to stop this surface mould. The treated pear wrapper already has proved to be a marvel for conservation, and Dean Natwick and Technician Barber were recently recipients of scrolls from the National Association of Manufacturers expressing recognition and appreciation for this great step in tech- (*Continuing on page* 333)

REMEMBER 1910!

IT CAN HAPPEN AGAIN—PREVENT FOREST FIRES

By STANLEY KOCH

IN THE chronicles of Paul Bunyan, folklore's lumberjack superman, time is reckoned from the Winter of the Blue Snow. In Western Montana and the panhandle section of Idaho, events are dated either before or after the great fire of 1910.

In two dreadful days that summer, forest fires traveling at express train speed across the backbone of the Continental Divide destroyed more than 3,000,000 acres of America's waning supply of virgin timber. Towns and villages, mining camps, homesteads, lumber mills and railroad property — all were destroyed in an area as large as the state of Connecticut. Eighty-five people lost their lives, hundreds were severely injured and thousands more escaped with nothing but the clothes on their backs.

Burning firebrands the size of a man's arm were thrown down in the streets of towns fifty miles from the nearest fire line. For days the sun was obscured in Billings, Montana, 500 miles away. Smoke darkened the sky in Denver, and at Kansas City, 1,200 miles distant, the weather man recorded its taint.

The winter of 1909-10 had been normal, the old-timers will tell you, with the usual heavy snowfall in the mountains. But the summer drouths started early all over the region. The hills hardly got green that spring. July followed with intense heat. Crops burned up and the forests became tinder-dry, ready to explode at the touch of a spark.

In June the fires began, started mainly by electrical storms with some assistance from incendiarists and careless railroad crews.

The newly organized forest-protection forces of the U. S. Forest Service were thinly scattered. There were no lookouts, and detection of fires depended on intermittent patrols. In the vast wildernesses of the St. Joe, Clearwater, Salmon and Flathead rivers there were only a few primitive trails along the natural routes formed by the main divides and ridges. The great river canyons of the St. Joe and Clearwater were still almost inaccessible.

In the face of all these difficulties the little force of forest rangers and guards struggled desperately with the constantly recurring fires. On July 15 over 3,000 men were employed as firefighters. The supply of floating labor was exhausted and President Taft authorized the use of the regular Army.

By August 15 weary crews had managed to control some 3,000 small fires and ninety major blazes. As the fire season neared its close, it seemed that the region might still escape without overly heavy losses, bad as the fires had been.

But such was not to be.

In the canyons and valleys of the timbered country where these isolated fires raged, a resinous, sooty smoke had hung for days, sometimes smothering the sun and turning midday into night. In the villages lamps were lighted at three o'clock in the afternoon. Conductors on trains carried lanterns all day to read the tickets of their passengers.

Erected at St. Maries, Idaho, this monument speaks today

"Nature appeared to be stifled under this curtain of smoke," said a writer of the time. "People panted for a breath of air, their lungs burning, their eyes inflamed. The air was oppressively quiet, suffocatingly dead. The stillness of desolation rested above camps and towns. Sounds were muffled as by a vacuum. Birds staggered through the smoky chaos on bewildered wings, panting, lost. Horses strained at their halters, looking upon their masters with strange eyes, uncomforted by caresses, unassured by words. Where a beast, by a terrified lunge, broke its restraining tether, it dashed away into the wilderness. Even chickens deserted their coops, seeking

Above. Billows of fire and smoke, sweeping over northern Idaho and Montana in 1910, turned day into night, took almost a hundred lives, destroyed several towns and paralyzed a region equal in size to the whole State of Connecticut

Below. This photograph taken on the Coeur d'Alene National Forest shortly after the 1910 fires, shows what happened to eight billion feet of standing timber in Idaho and Montana—enough lumber to supply one-third our war needs this year

refuge at the margin of some stream. Dwellers in the woods and travelers on dim trails saw forest creatures flying in one general direction, as if pursued by a foe that struck a deeper terror than man. Bear, deer, or mountain lions scarcely lifted their heads at sight of a man, or moved out of his path to let him pass."

So fell the evening of August 20, 1910.

On the Lost Horse Trail, deep in the Bitterroot Range, a forest guard stirred uneasily in his sougans (a thin, generally shoddy, quilt). Something pattered on the tent roof. "Rain?" he wondered, and stuck his head outside. Wind was moaning through the tree tops, dropping needles and refuse on the tent. "Damn," he said, "why couldn't it just as well be rain?"

A few minutes later one of his crew of thirty men called him out again. A star, he said, had fallen on the hillside across from camp, setting a small fire. The forest guard swung around, into the wind. There on the western horizon, a fiery glow lit the sky for mile after mile. He knew then what the "star" was and what it meant.

Thus the holocaust began.

Sweeping northeast from the Snake River desert country, dry hot winds soon reached tornado proportions, fanning every blaze into a raging inferno of flame. Little fires exploded into big fires. In the surcharged, gale-driven atmosphere the whole world seemed to burst into spontaneous combustion. Traveling at seventy miles an hour the flames tore across mountain ranges, leaped major rivers and mile-wide canyons as though they were irrigation ditches. The front of the fire was an awe-inspiring spectacle. The first wave of flames towered hundreds of feet into the air while exploding gases shot whistling, incandescent tongues of fire a thousand feet into the sky. The roar of igniting gas, skyrocketing flames and falling forest giants was indescribable.

Men who went through the fire were dumb for days in their struggle for words to measure the fire's horror. "The world was afire," they said, "the earth, the air, everything."

The city of Wallace, Idaho, lay in the path of the first sweep of flames. Riding hell-for-leather down a smoke-choked canyon, trying to warn the restless people, a forest ranger was caught by the flames, forced to abandon his errand and take refuge in a mine tunnel.

At 9:15 on the night of August 20 fire broke into town. By 10:30, when a refugee train loaded with fleeing men, women and children pulled out for Missoula, Montana, a third of the town lay in ashes. Nuns carried the last patients out of Providence Hospital just as flames ignited the rear of the structure.

Wired the telegraph operator of the Northern Pacific Railroad just before the line burned out: "Every hill around town is a mass of flames and the whole place looks like a death trap. No connections can be had with outside towns. Men, women and children are hysterical in the streets and leave by every possible conveyance and route."

Had it not been for cool-headed, heroic work of train crews, loss of life would have reached into the thousands. The Northern Pacific relief train, whistle blowing wildly, ran east from Wallace, picking up refugees from Mullan, Saltese, Taft, DeBorgia, Haugan and Tuscor. The last four towns were completely destroyed.

The Milwaukee Railroad had just opened up its line through this territory. Along the forty-eight miles of track crossing the Continental Divide from Avery, Idaho, to Haugan, Montana, were a thousand people, mostly railroad employes, their wives and children. A girl telephone operator gave the warning, the line going dead in the midst of her call. Women and children from Avery, on the west side of the Divide, were evacuated in thirty minutes, a company of negro soldiers standing guard on the platforms of the cars as they made their dash through the flames and smoke westward for Spokane. The men and remaining soldiers followed in box cars. On the east side, work trains were ordered to pick up every living soul and make a run for the east, or west to Taft Tunnel, a two-mile bore at the Continental Divide.

Still not accounted for were some fifty workers on the west side of the Divide, between the tunnel and Avery. In spite of flame-swept tracks and burning timber bridges towering a hundred feet above rocky gorges, a volunteer crew set out down the hill with an engine and three cars, knowing they could never get back to the tunnel. When the train reached the refugees huddled along the track, many of them had to be lifted bodily and put aboard. "Groups of Hungarians, bundles of bedding and clothing on their backs, stood with tears streaming down their faces," a trainman reported. "We had to pick some of them up and put them in the cars, but when they once understood that there was a chance for life they fell to fighting, pulling each other from the train, pushing women and children out of the way, but sticking to their bedding to the last. We had to cut the ropes from their shoulders to make them let the bundles go."

Forty-seven people were picked up and a run was made for Tunnel Thirty-two, a short bore but the only available refuge. As it was impossible to see beyond the steam dome of the boiler, the engineer could only pray that he would not plunge through a flaming bridge or crash into a fallen tree. There was nothing to do but go on. He opened the throttle wide, pounding into the smoke. They made the tunnel, but even there the fire reached in after them. Fortunately a rivulet ran through the bore, and by keeping their clothing soaked they managed to endure.

The whole forty-eight miles of railroad through the rugged country between Avery and Haugan was swept by a devouring blast of fire so hot that pick handles, lying in the open beside the track, were utterly consumed. Water in barrels at the ends of bridges boiled and evaporated away, the staves burning down as fast as the water level sank. Ties burned out of the tracks, the rails buckled and kinked like wire, nineteen bridges were destroyed. Everything was swept clean to the tunnels' mouth. But a thousand lives were saved. Only those who could have struggled on foot into the tunnels would have survived. Few could have made it, in that suffocating smoke and searing, blinding heat.

The terrific uprush of fire from the western drainages over the Continental Divide caught every firefighting crew in the territory. Too late to escape, they were doomed unless they could find a safe place to weather the gale-driven flames.

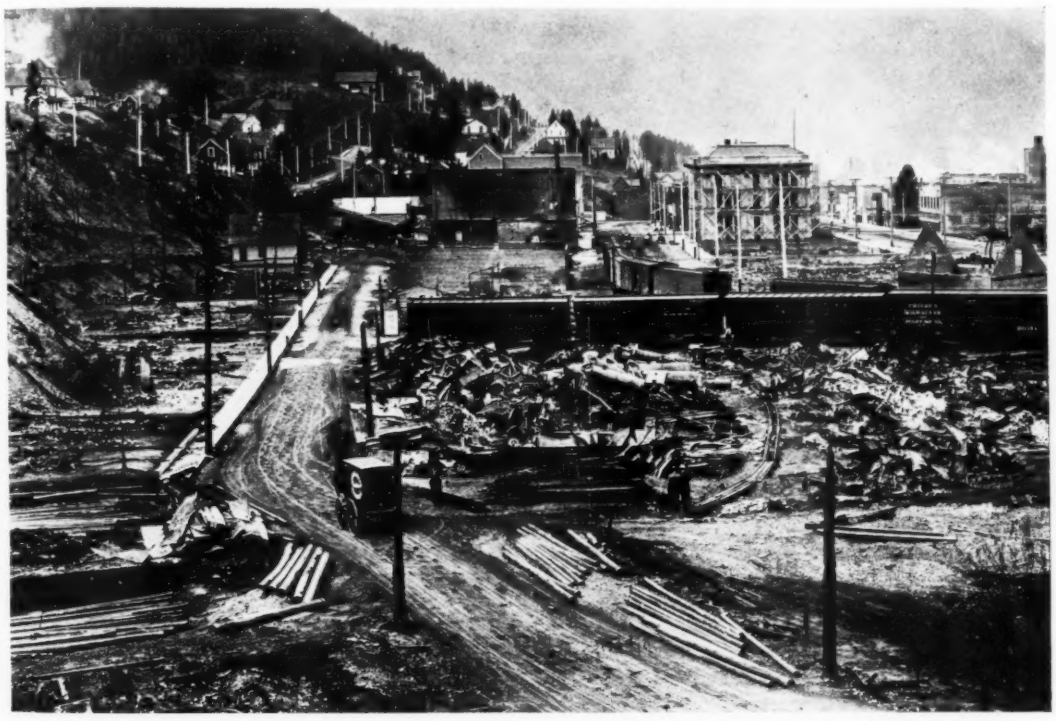
All day Sunday, the 21st of August, reports of terrible loss of life came in as scorched and burned fire-fighters stumbled into town with tales of terror and disaster.

Edward C. Pulaski, grandson of the famous Polish exile, Count Casimir Pulaski, who fought and died for American independence, was in charge of forty-three men about ten miles from Wallace. When the blowup came Pulaski rounded up his crew, most of them unfamiliar with the region, and tried to reach Wallace. Barred by fire, he headed for a nearby mine tunnel, hoping to reach it before the flames overtook them. Already it was pitch dark, though Pulaski's watch showed midday. One man, lagging behind, was killed by a falling tree. By the time the men reached the mine most of them were hysterical and panic-stricken. Pulaski was forced to order them into the tunnel at the point of his gun. The forty-two men and two horses crowded into the 100-foot long prospect hole and Pulaski took up his station at the entrance. Fortunately two or three blankets had been salvaged. These were soaked in water and hung across the opening. With his hat, Pulaski dashed water from a small spring over the burning mine timbers and blankets.

He had commanded the men to lie down, with their faces to the ground, but in the hours that followed, the tunnel, filled with smoke and gas, became a madhouse. In a panic of fear, crying and praying, man after man rushed the entrance, threatening to kill Pulaski unless he let them by. But Pulaski drove them back with his revolver until finally, one by one, they fell unconscious. At length Pulaski himself, his lungs seared, his eyes blinded, and completely exhausted from fighting both men and fire, crumpled at the entrance. Hours later he awoke, hearing a man say:

"Come on outside, boys, the boss is dead."

"Like hell he is," Pulaski replied.



The prosperous city of Wallace, Idaho, which was partially destroyed, is shown here starting to rebuild its devastated sections. The city suffered a property loss of one million dollars

It was five o'clock Sunday morning. They counted noses. Five were found dead, back in the tunnel. The two horses were in such bad shape they had to be shot. Burned, blind and smoke-choked, the remaining men dragged and crawled their way into Wallace. All recovered, though Pulaski was in the hospital for two months before he regained his sight.

One crew, racing ahead of the flames, sought refuge in a small creek running through a homesteader's clearing. Seven men, thinking they would be better off in a cave the homesteader had dug in a hill, were burned beyond recognition, and three men lying in the creek were killed by falling timber. The survivors had all the skin burned off the backs of their necks and heads. A seventeen-man rescue crew, bringing packhorses and doc-

tors, spent two days and nights cutting through twelve miles of down timber to reach the clearing.

For nearly a week after the fire it was believed that Ranger Joe Halm had perished with his crew of sixteen men. Halm had gone back into the St. Joe Wilderness, sixty-five miles across the Bitterroot Range, to fight the Bear Creek fire. When a rescue party finally cut through, Halm told his story.

The fire caught them on Saturday afternoon, August 20. Three men, believing safety lay in flight, refused to stay.

"Things did look bad," Halm says. "I slipped into my tent and strapped on my gun. As I stepped out a red glow was already lighting the sky. The men were pointing excitedly to the north."

"She's jumped a mile across the canyon," said the foreman.

Halm put his hand on his gun. "Not a man leaves camp. We'll make our stand on that gravel bar in the creek."

Frying pans, pails and one blanket for each man were moved to the bar. Meanwhile the wind had risen to hurricane velocity.

"Fire was all around us, flames licking the sky," Halm recounts. "Showers of flaming brands fell everywhere. The quiet of a few minutes before had become a horrible din. The hissing, roaring flames, the terrific crashing and rending of falling timber was terrifying. One young giant, crazed with fear, broke and ran. I dashed after him. He came back, wild-eyed, crying, hysterical. The fire closed in. The heat became intolerable. A giant tree crashed across the bar; one man went down, but came up unhurt. A few yards below a log jam an acre in extent became a roaring furnace, a threatening hell. If the wind changed, a single blast from this inferno would wipe us out. Our drenched clothing steamed and smoked; still the men fought. Another tree crashed, cutting deep into the little bar, blinding and showering us with sparks and spray."

Hours later the screaming, hissing and snapping of millions of doomed trees, the showers of sparks and burning brands grew less. The fire gradually subsided. Save for minor burns and injuries, all were safe.

The big fellow who had tried to run the night before slapped Halm on the back and handed him his gun.

"You lost her in the creek last night. You saved my life," he said simply. His lips trembled as he walked away.

So it went with crew after crew. Those who stayed with the trained and experienced forest rangers and guards generally came through alive. The panic-stricken, who tried to make a run for it, were caught by the flames, burned beyond recognition.

The fires swept fiercely on all day the 20th and 21st. On the 22nd and 23rd a change in wind and humidity slowed down the conflagration and then, like a miracle to the worn and wasted people of the northwest, on the night of the 23rd a general rain, with snow on the high ranges, checked the flames.

The following week burning conditions again picked up, and the widespread fires made some advance. Frantic, if ill-informed citizens pleaded with the Army to fire off its big guns to jar loose a deluge from the heavens. When the Army skeptically refused, President Taft was swamped with indignant telegrams. Most of the fire crews had been driven out of the hills. Camps and equipment had burned. But under the spur of the U. S. Forest Service, crews were again organized on a large scale and set about cutting off the spread of fires and opening up trails through the burned country. A good general rain beginning the night of August 31 ended the northwest's thirty-day war.

When the terrible toll of losses was finally added up, 80 fire-fighters were dead on the Coeur d'Alene, Cabinet and Pend Oreille Forests. Two lives were lost in the burning of Wallace and one at Taft. A peg-leg prospector was burned near Joe Halm's valiant stand and three homesteaders lost their lives near Newport, Idaho. Many of the surviving firefighters were terribly burned, and as the pitiful remnants of the crews staggered out of the mountains the hospitals were filled with injured men.

The loss in timber, property and man-days of labor to the logging communities is estimated as high as $695,000,000. A million dollars worth of property was destroyed in Wallace alone. Nearly eight billion board feet of timber was destroyed, including some of the finest stands of white pine in America.

The writer's father, who was Supervisor of the Lolo Forest at the time, tells of walking through the charred and blackened remains of a once beautiful spruce grove.

"The still warm ashes were knee deep where once I had walked in cool forest aisles. For mile after mile, as far as the eye could reach, lay a smoldering, desolate waste. Stunned and heartsick, I never wanted to see the country again."

As news of the great fire spread over the nation, an outraged public poured vitriolic wrath on Congress for withholding firefighting funds from the Forest Service.

This spring again, the Northwest is restless and uneasy, as the snowline retreats under a warm summer sun and the fire season approaches all too rapidly. With the Civilian Conservation Corps reduced almost to the vanishing point, with every able-bodied man either in the Army or working in war production industries, where, they ask, will firefighters be obtained? And why, this summer of all summers, has Congress wrangled and delayed over voting a few million dollars of fire control funds as protection against another holocaust like that of 1910?

Forest officials hope and believe there can never be another 1910 fire. Yet they know that the shortage of firefighting men and money is setting a stage which needs only a prolonged drought,—common corollary of the searing mid-summer sun,—to create conditions favorable to another blow-up.

So, if you plan to enter forest regions this summer for pleasure or business, remember the potential power of fire in the woods to paralyze great sections of our country and thereby cripple our war effort.

REMEMBER 1910 AND PREVENT FOREST FIRES.

TRAPPERS OF THE PINE BARRENS

By HARRY STANTON TILLOTSON

THE pine barrens of southern New Jersey have long been known as the naturalist's happy hunting ground. The distinctive flora of this region has attracted the attention of botanists since the early part of the eighteenth century when John Bartram, who is called the father of American botany, and his son William, made frequent trips to its woods and bogs to collect specimens for study.

To the casual tourist the country may seem to be little more than a flat, sandy waste with monotonous stretches of scrub pines, but the true nature lover finds here plenty of beauty and interest. It is the home of some of our loveliest native orchids,—the Rose Pogonia, the Arethusa and the Pink Lady Slipper. Here also may be found the Turks' Cap Lily, the Swamp Magnolia, the Sweet Pepper Bush and the clammy Azalea, while the High-bush Blueberry grows in riotous abundance.

But for those with a particular interest in the odd and curious in nature, there are to be found several of the strange species that depend upon the trapping of insects in procuring an adequate supply of food,—carnivores of the plant world. Among these are the tiny Bladderworts that are found in ponds and sluggish streams, using their bladder-like pouches as nets to capture water insects. Sometimes also very small fishes find themselves prisoners in the trap-door mechanisms of these "bladders."

In the extensive bogland of southern New Jersey is the home of the common Pitcher Plant (*Sarracenia purpurea*) and all three American species of the Sundew. It was for the special purpose of collecting specimens of the latter, needed in experimental work that I journeyed to the bogs near Atsion. All the Sundews are small plants and sharp eyes are required in distinguishing these tiny plants in their native haunts. Fortunately we were able to collect several plants of each species and in order to provide conditions as near as possible to those of their natural habitat, we took a quantity of the sandy bog soil and sphagnum moss in which we found the specimens.

The most common form of the Sundew is *Drosera rotundifolia*, but we also found an extensive stand of the relatively rare thread-leaved and long-leaved types. The Long-leaved—or perhaps more descriptively, *Spoon-leaved* Sundew—extends its leaves in wheel fashion on slender petioles. The nearly oval leaves are barely an eighth of an inch in diameter and are surrounded with tentacles bearing at their tips small, glistening, crimson knobs that appear under the microscope like highly polished rubies. These are covered with a powerfully adhesive secretion that gives them a suggestion of dewdrops sparkling in

Harry Stanton Tillotson

The Long-leaved Sundew, one of the group of trappers of the pine barrens of southern New Jersey, flourishes in the spongy soil of a cranberry bog

the sun, hence the common name,—Sundew.

In the center of the upper surface of the "spoon" are numerous red glands. These are either sessile or slightly raised. They serve in the production of a digestive fluid when an insect victim is finally subdued. Lured, no doubt, by the prospect of a drink of dew, the insect lands on one of the tentacles, only to find its feet adhering firmly and the more it struggles to free itself, the more hopeless becomes its situation. The nearby tentacles by some strange impulse now "gang up" on the captive and finally push it to the center of the leaf where the digestive glands are brought into action with a flow of their secretion, thus preparing it for consumption as food for the plant.

The Thread-leaved Sundew, its narrow leaves bordered with viscid tentacles from root to tip, operates in a similar manner. Several of these plants when found in a cranberry bog, held captive many small gnats and other insects. One plant had trapped a full-grown fly and a mosquito, though the leaves were barely a sixteenth of an inch wide and five inches long.

Experiments with the Long-leaved Sundew showed that it relishes other nitrogenous foods as well as the bodies of insects. Three fully developed leaves on as many plants were selected for the purpose. On one of these was placed a very small piece of roast beef, on the second a piece of cheese of about the same size and on the third a small fragment of the white of a hard-boiled egg.

Bureau of Plant Industry, U.S.D.A.

Woe unto the insect approaching here, for the "claws" of this Venus Flytrap are open — ready to receive their victims

Bureau of Plant Industry, U.S.D.A.

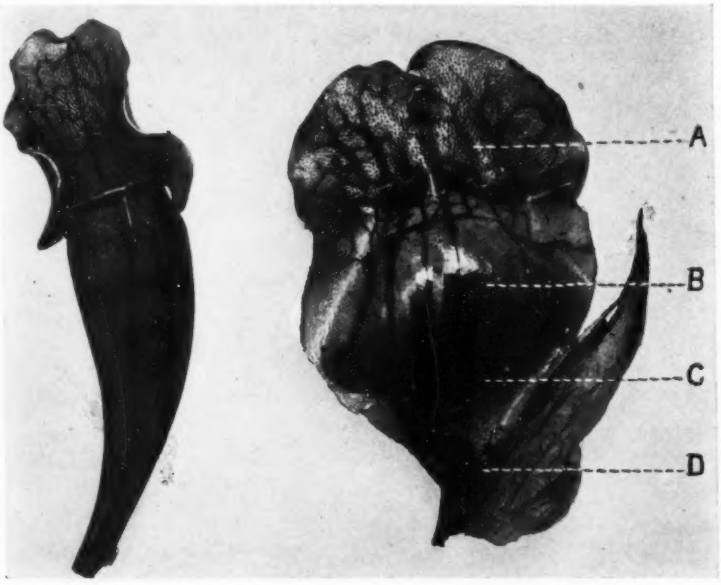
Strange in their ways, and beautiful, are the Pitcher plants—dwellers of the bogs, like the voracious Sundews

Within an hour the tentacles on all the leaves had inclined toward the unusual food. Soon a glistening secretion began to flow from the central glands. By the end of the second day all the tidbits were covered with this fluid and were reduced in size. At the conclusion of the fourth day the cheese and egg had been completely consumed and the meat almost so, though the leaf bearing the latter had turned black and was showing signs of decay. The flow of the secretion had stopped on all the leaves and on all, with the exception of that containing the meat, the tentacles had resumed their normally expanded positions.

A similar reaction to nitrogenous foods was also observed in the case of the Thread-leaved Sundew. While examining a leaf of this plant with a hand glass, a very small spider was

discovered making its way from the tip of the leaf to the ground by means of its web filament. The unsolved mystery is how it managed to release itself from the Sundew's sticky tentacles, upon which it had evidently landed.

Another interesting bog dweller is the common Pitcher Plant often found as a neighbor of the Sundews. Its purple-veined leaves are so constructed as to form water-tight vessels or "pitchers" with winged spouts at the top. The spout is covered with honey glands that exude the bait for the hungry insect. Among these glands are stiff, downward-pointed hairs that prod the victim to its doom. Finally reaching the inside of the pitcher it approaches a highly polished surface where a foothold is almost impossible and it drops into a sticky bath at the base of the vessel. Even though it succeeded in freeing itself from this mire, escape would be practically impossible for, just above the fatal pool, like a ring of bayonets, is a barricade of thin but tough hairs that would bar its way. When the insect's struggles cease, the plant absorbs the substance of its decaying body.



The leaf of the common Pitcher Plant. At the left, the "pitcher" is closed. At the right, it is opened to show the interior and the intricate working parts of the plant. (A) The honey glands that lure the insect to its doom. (B) The highly polished surface from which it slips into the sticky pit at the base of the leaf. (C) Here a fringe of downward-pointing hairs effectively prevents escape, and (D), the decaying bodies of the captives, that supply nutriment to the plant

It is noteworthy that most of the widely distributed insectivorous plants known to science have very little roothold and depend almost wholly on their leaves in procuring sustenance. One of these, the Butterwort, has such frail roots that it is easily dislodged but apparently keeps a reserve of moisture in its succulent leaves which grow in rotate formation close to the ground. The edges of these are upturned like a hat brim.

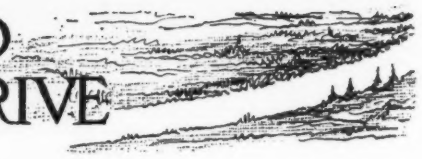
The center of the leaf is covered with delicate, crystalline hairs that give it a greasy feeling and account for the common name of the plant. These hairs which are somewhat viscid, usually trap only very small insects after which the secretion of the leaf undergoes a change and becomes a digestive agent. The flow of this secretion upon excitation sometimes becomes so profuse as to almost overflow the "dike" formed by the upturned leaf margins. Linnæus asserted that the Laplanders utilized the "vegetable rennet" of these leaves to curdle reindeer milk.

Various types of this plant are found in Europe, Asia and North America. An experiment with a plant of the American species (*Pinguicula lutea*) undertaken by the writer was foiled by the activities of ants. Food was placed on three leaves. On two of these the food was placed near the center and on the third a small piece of cheese was placed under the rolled margin. A day later no trace of the food was found on the two first leaves but on the third, two ants were valiantly working from the overhang to take the cheese without being caught. On one of the other leaves, near the tip, was the body of an ant, more venturesome than the others, completely covered with the leaf's fluid. This plant is found in the pine barrens of North Carolina and southward.

Still another plant huntsman of the southern wastelands is the Venus Fytrap (*Dionaea muscipula*) which is found growing wild in only one place, a very limited area near Wilmington, North Carolina. Its leaf, fringed with coarse bristles and hinged at the midrib, closes rapidly when the inquisitive insect touches a small cluster of sensitive hairs that are found in the center of each half leaf. One of these hairs must be touched twice or two of them simultaneously in order to spring the trap. When its feast is over the leaf slowly re-opens, drops the inedible parts of its "meat" and resets its trap for another capture.

The plant's trap may be sprung artificially by irritating the delicate central hairs with a piece of string or a thin straw but in such a case the leaf only partially closes or soon re-opens, seeming to sense the deception.

THE ROUND RIVER DRIVE

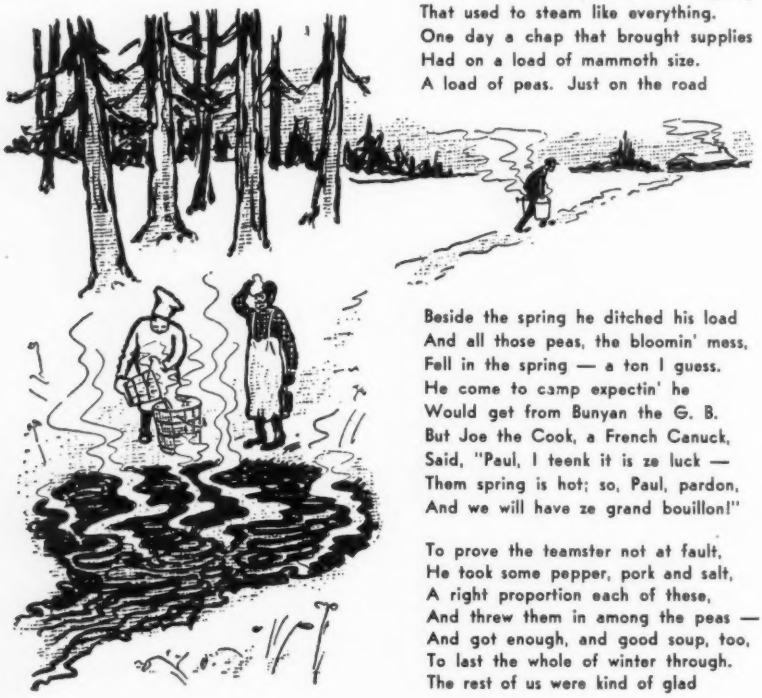


By DOUGLAS MALLOCH

"The Lumberman Poet"

These are days of mighty lumbering feats — getting wood out of the forests to win a world war. Just to remind our readers that in other wars there have been great goings-on in the lumber woods, Douglas Malloch's version of "The Round River Drive" is here reprinted by courtesy of *The American Lumberman*, as it appeared in April 1914.—Editor

'Twas '64 or '65
We drove the great Round River Drive;
'Twas '65 or '64 —
Yes, it was durin' of the war,
Or it was after or before.
Those were the days in Michigan,
The good old days, when any man
Could cut and skid and log and haul,
And there was pine enough for all.
Then all the logger had to do
Was find some timber that was new
Beside a stream—he knew it ran
To Huron or to Michigan,
That at the mouth a mill there was
To take the timber for the saws.
(In those old days the pioneer
He need not read his title clear
To mansions there or timber here.)
Paul Bunyan, (you have heard of Paul?
He was the king pin of 'em all,
The greatest logger in the land;
He had a punch in either hand
And licked more men and drove more miles
And got more drunk in more new styles
Than any other peavey prince
Before, or then, or ever since.)



Paul Bunyan bossed that famous crew:
A bunch of shoutin' bruisers, too —
Black Dan MacDonald, Tom McCann,
Dutch Jake, Red Murphy, Dirty Dan,
And other Dans from black to red,
With Curley Charley, yellow-head,
And Patsy Ward, from off the Clam —
The kind of gang to break a jam,
To clean a bar or rassle rum,
Or give a twenty to a bum.

Paul Bunyan and his fightin' crew,
In '64 or '5 or '2,
They started out to find the pines
Without much thought of section lines.
So west by north they made their way
One hundred miles until one day
They found good timber, level land,
And roarin' water close at hand.

They built a bunk and cook-house there;
They didn't know exactly where
It was and, more, they didn't care.
Before the Spring, I give my word,
Some mighty funny things occurred.

Now, near the camp there was a spring
That used to steam like everything.
One day a chap that brought supplies
Had on a load of mammoth size.
A load of peas. Just on the road
Beside the spring he ditched his load
And all those peas, the bloomin' mess,
Fell in the spring — a ton I guess.
He come to camp expectin' he
Would get from Bunyan the G. B.
But Joe the Cook, a French Canuck,
Said, "Paul, I teenk it is ze luck —
Them spring is hot; so, Paul, pardon,
And we will have ze grand bouillon!"

To prove the teamster not at fault,
He took some pepper, pork and salt,
A right proportion each of these,
And threw them in among the peas —
And got enough, and good soup, too,
To last the whole of winter through.
The rest of us were kind of glad
He spilt the peas, when soup we had —
Except the flunkeys; they were mad
Because each day they had to tramp
Three miles and tote the soup to camp.
Joe had a stove, some furnace, too,
The size for such a hungry crew.
Say what you will, it is the meat,
The pie and sinkers, choppers eat
That git results. It is the beans
And spuds that are the best machines
For fallin' Norway, skiddin' pine,
And keepin' hemlock drives in line.
This stove of Joe's it was a rig
For cookin' grub that was so big
It took a solid cord of wood
To git a fire to goin' good.
The flunkies clean'd three forties bare
Each week to keep a fire in there.
That stove's dimensions south to north,
From east to westward, and so forth,
I don't remember just exact,
And do not like to state a fact
Unless I know that fact is true,
For I would hate deceivin' you.
But I remember once that Joe
Put in a mammoth batch of dough;
And then he thought (at least he tried)
To take it out the other side.
But when he went to walk around
The stove (it was so far) he found
That long before the bend he turned
The bread not only baked but burned.

We had two coons for flunkeys, Sam
And Tom. Joe used to strap a ham
Upon each foot of each of them
When we had pancakes each A.M.
They'd skate around the stove lids for
An hour or so, or maybe more,
And grease 'em for him. But one day
Old Pink-eye Martin (anyway
He couldn't see so very good),
Old Pink-eye he misunderstood
Which was the bakin'-powder can
And in the dough eight fingers ran
Of powder, blastin'-powder black —
Those niggers never did come back.
They touched a cake, a flash, and poof!
Went Sam and Tommy through the roof.
We hunted for a month or so
But never found 'em — that, you know,
It was the year of the black snow.

We put one hundred million feet
On skids that winter. Hard to beat,
You say it was? It was some crew.
We took it off one forty, too.
A hundred million feet we skid —

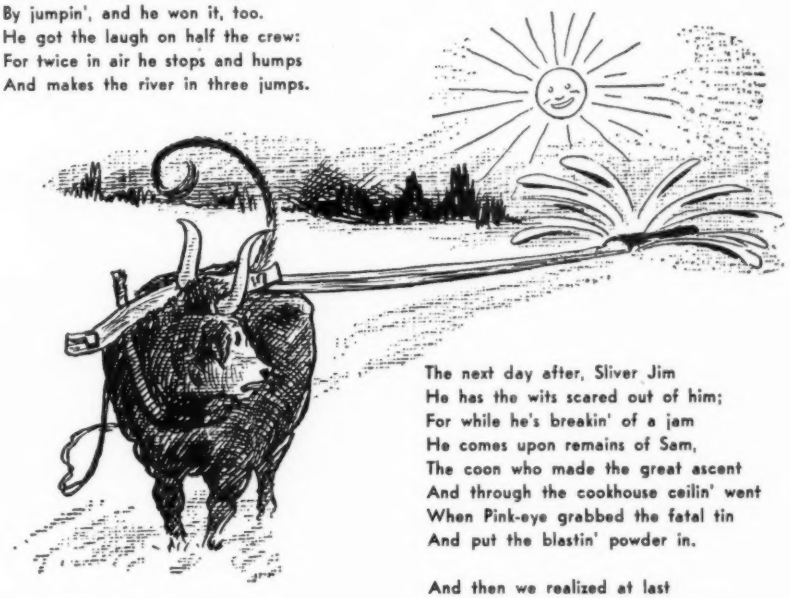
That forty was a pyramid;
It run up skyward to a peak —
To see the top would take a week.
The top of it, it seems to me,
Was far as twenty men could see.
But down below the stuff we slides,
For there was trees on all four sides.
And, by the way, a funny thing
Occurred along in early Spring.
One day we seen some deer tracks there,
As big as any of a bear.
Old Forty Jones (He's straw-boss on
The side where those there deer had gone)
He doesn't say a thing but he
Thinks out a scheme, and him and me
We set a key-log in a pile,
And watch that night for quite a while.
And when the deer come down to drink
We tripped the key-log in a wink.
We killed two hundred in the herd —
For Forty's scheme was sure a bird.
Enough of venison we got
To last all Winter, with one shot.

Paul Bunyan had the biggest steer
That ever was, in camp that year.
Nine horses he'd out-pull and skid —
He weighed five thousand pounds, he did.
The barn boss (handy man besides)
Made him a harness from the hides
Of all the deer (it took 'em all)
And Pink-eye Martin used to haul
His stove wood in. Remember yet
How buckskin stretches when it's wet?
One day when he was haulin' wood,
(A dead log that was dry and good)
One cloudy day, it started in
To rainin' like the very sin.
Well, Pink-eye pounded on the ox
And beat it over roads and rocks
To camp. He landed there all right
And turned around — no log in sight!
But down the road, around the bend,
Those tugs were stretchin' without end.
Well, Pink-eye he goes in to eat.
The sun come out with lots of heat.
It dried the buckskin that was damp
And hauls the log right into camp!

That was a pretty lucky crew
And yet we had some hard luck, too.
You've heard of Phalen, double-jawed?
He had two sets of teeth that sawed
Through almost anything. One night
He sure did use his molars right.
While walkin' in his sleep he hit
The filer's rack and, after it,
Then with the stone-trough he collides —
Which makes him sore, and mad besides.
Before he wakes, so mad he is,
He works those double teeth of his,
And long before he gits his wits
He chews the grindstone into bits.

But still we didn't miss it so;
For to the top we used to go
And from the forty's highest crown
We'd start the stones a-rollin' down.
We'd lay an ax on every one
And follow it upon the run;
And, when we reached the lowest ledge,
Each ax it had a razor edge.

So passed the Winter day by day,
Not always work, not always play.
We fought a little, worked a lot,
And played whatever chance we got.
Jim Liverpool, for instance, bet
Across the river he could get
By jumpin', and he won it, too.
He got the laugh on half the crew:
For twice in air he stops and humps
And makes the river in three jumps.



We didn't have no booze around
For every fellow that we found
And sent to town for apple jack
Would drink it all up comin' back.
One day the bull-cook parin' spuds
He hears a sizzlin' in the suds
And finds the peelin's, strange to say,
Are all fermentin' wheer they lay.
Now Sour-face Murphy in the door
Was standin'. And the face he wore
Convinced the first assistant cook
That Murphy soured 'em with his look.
And when he had the parin's drained
A quart of Irish booze remained.
The bull-cook tells the tale to Paul
And Paul takes Murphy off the hall,
And gives him, very willingly,
A job as camp distillery.

At last, a hundred million in,
'Twas time for drivin' to begin.
We broke our rollways in a rush
And started through the rain and slush
To drive the hundred million down
Until we reached some sawmill town.
We didn't know the river's name,
Nor where to someone's mill it came,
But figured, that, without a doubt,
To some good town 'twould fetch us out
If we observed the usual plan
And drove the way the current ran.

Well, after we had driven for
At least two weeks, and maybe more,
We come upon a pyramid
That looked just like OUR forty did.

Some two weeks more and then we passed
A camp that looked just like the last.
Two weeks again another, too,
That looked like OUR camp, come in view.
Then Bunyan called us all ashore
And held a council-like of war.
He said, with all this lumbering,
Our logs would never fetch a thing.

The next day after, Sliver Jim
He has the wits scared out of him;
For while he's breakin' of a jam
He comes upon remains of Sam,
The coon who made the great ascent
And through the cookhouse ceilin' went
When Pink-eye grabbed the fatal tin
And put the blastin' powder in.

And then we realized at last
That ev'ry camp that we had passed
Was OURS. Yes, it was then we found
The river we was on was round.
And, though we'd driven many a mile,
We drove a circle all the while!
And that's the truth, as I'm alive,
About the Great Round River drive.

What's that? Did ever anyone
Come on that camp of '61,
Or '63, or '65,
The year we drove Round River drive?
Yes, Harry Gustin, Pete and me
Tee Hanson and some two or three
Of good and truthful lumbermen
Came on that famous camp again.
In west of Graylin' 50 miles,
Where all the face of Nature smiles,
We found the place in '84 —
But it had changed some since the war.
The fire had run some Summer through
And spoiled the logs and timber, too.
The sun had dried the river clean
But still its bed was plainly seen
And so we knew it was the place
For of the past we found a trace —
A peavey loggers know so well,
A peavey with a circle L,
Which, as you know, was Bunyan's mark.
The hour was late, 'twas gettin' dark;
We had to move. But there's no doubt
It was the camp I've told about.
We eastward went, a corner found,
And took another look around.
Round River so we learned that day,
On Section 37 lay.

NEW PRODUCTS FROM REDWOOD

A One Hundred Per Cent American Is Serving America in New and Important Ways

By
SIGMUND SAMETH

UP UNTIL a few years ago, Pacific Coast lumber operators nursed many a headache over disposal of waste which accumulated during the process of converting sequoia or redwood logs into beams, boards and other building material. Unlike some of the pine and hardwood mills which utilized mill trimmings, bark and sawdust to fire boilers, California redwood lumbermen found it difficult to burn their waste products. Redwood bark, even the wood itself, is surprisingly resistant to fire. As a result, the problem of disposal mounted with every new pile of waste.

Today it is a different story. Not only has the redwood industry solved a troublesome problem, but it has turned mill waste into a million dollar by-product. Today shredded redwood bark is one of America's strategic insulating materials—so valuable that the OPM has given it a high priority rating. But that is not all. With wool shortages becoming serious because of shipping conditions, redwood bark is producing fabric "wool" which can be used in blankets and clothing. Redwood sawdust is being converted into a floor cleaning preparation, and is also compressed into fuel logs for the fireplace.

Name any common insulating material you can think of—cork, corkboard, glass wool, mineral wool, sheep wool, hair felt, planer shavings, balsa wood, hollow blocks of tile—and shredded redwood bark tops it in resisting the passage of heat. This is not an idle boast of some manufacturer's sales representative. It is a cold fact based on findings of the

Loading the great redwood logs on flat-cars to go to the mills, where the bark will be removed and transformed by the magic of science into new and useful products

Peeling the tremendous log to secure the bark, which must be pried loose with chisel-edged steel bars. Then the shredding operations begin

United States Bureau of Standards and of J. C. Peebles of the Armour Institute of Technology. Only expensive kapok tops redwood bark in insulating value, and the use of this material in building, because of high cost, is almost nil. The exact quantity of shredded redwood bark produced annually is withheld by governmental order, but the tonnage is tremendous.

Uncle Sam is finding many military uses for redwood insulation, including the famous "Quonset Huts" which keep American troops cool in the Canal Zone and warm in Iceland. These remarkable steel prefabricated houses contain a layer of the insulating wood fibre between the composition inner walls and the corrugated outer surface. Ordnance experts who designed the huts simply took a tip from the building experts in civilian fields. For it is in civilian fields that redwood insulation has proved its great value.

Consider the comfort which inexpensive insulation adds to the American home. Fifteen to twenty degrees cooler on the hottest days—that is the verdict of home owners who have used redwood insulation. In winter fuel savings are effected, and this is especially important now when every ton of coal and every tank of fuel oil is vitally needed for the war industries. In addition, fire resistant redwood insulation reduces hazards by filling hollow walls with a continuous fire stop. It is moisture resistant, odor proof and vermin repellent.

As far back as 1850 California settlers were hand-shredding redwood bark for use in ranch milkhouses. On the W. P. Beggs Ranch near Petaluma, visitors can see such a structure still in service after four generations. Fibres exposed when a section of the old wall was cut away showed unmistakably how durable is this natural insulating material. Fungi simply cannot live in it, eliminating the cause of decay. Moreover, permanent resilence of the fibres, and the fact that they do not shrink, means that settlement and "packing" cannot occur with lowered thermal resistance. These qualities are especially important where vibration is present—vibration such as the ceaseless throb of engines in the hull of a great battleship.

Redwood insulation — bales of shredded bark awaiting shipment. This material is used to insulate the Quonset huts which help keep American troops cool in the Canal Zone and warm in Iceland

On big trees, redwood bark is anywhere from twelve to eighteen inches thick. Every shred has to be removed before the saws can go to work. Otherwise it clogs the teeth of even the most open pattern saw. Lumbermen used to carry out the barking process where the tree fell in the woods. The tenacious stuff was pried loose with chisel-edged steel bars—a slow, expensive job. Now the logs are snaked out of the woods by tractors, loaded on railway flatcars, and hauled right to the mill. Barking is done there, still by hand methods, but speeded up by machinery to hold and turn the logs.

Refrigeration experts place redwood insulation in the A-1 class for use in frozen food locker plants such as this

The great heaps of shaggy bark are a long way from the commercial product after the barking crews complete their work. It still has to be shredded, an operation which takes place in a steel drum. Multiple rotary knives powered by electricity slice the solid chunks of bark into ribbon-like fibres even finer than the tobacco you tamp into your pipe.

Next, willowing and condensing machines remove dust and extraneous products and the shredded bark goes into the hoppers of picking machines. These remove lumps and unshredded fibres. It is ready now for the block-long battery of drying ovens. After this it is baled in neat hundred-pound packages, tagged and piled in storage sheds or on loading platforms for its journey of usefulness into the homes and factories of the nation.

Refrigeration experts rate redwood insulation A-1 for use in frozen food locker plants which place within the reach of the average citizen such modern miracles as spring chicken and strawberries in January. At the present time redwood insulation is protecting in locker storage plants throughout the country fresh frozen foods valued at upwards of $10,000,000. And the industry is still in its infancy. But 5,000 such plants exist in a nation where ten times that number would not take care of home-produced food products.

Redwood contributes to the wartime shortage of wool, for 50 per cent of the young lady's hat and 25 per cent of her wrap are of redwood "wool," or bark fiber

Farmers and town folks alike benefit from locker plants. On the farm they are largely a matter of convenience, eliminating tedious canning. In town they are a matter of economy, permitting purchases of meat, fruits and vegetables in wholesale quantities for storage until needed.

But redwood by-products do not end with shredded bark. The janitor in your own city hall may be using a floor cleaning preparation made of redwood sawdust. To-

(*Continuing on page* 336)

EDITORIAL

WAR DRAINS ON THE FOREST

WAR demands for wood continue to move upward and outward—upward in point of volume and outward in point of species and grades of lumber needed. At present writing, WPB estimates place 1942's over-all lumber requirements at between thirty-eight and thirty-nine billion feet. This includes both military and civilian "must" requirements. It represents an increase of about five billion feet over January estimates.

A month hence, present estimates may have to be extended because the military need for wood is outstripping day to day expectations. One reason is that wood is being resorted to more and more to save and replace scarce materials. Another reason is constant expansion of the war production program and military operations. A third is recognition of essential civilian needs of wood to maintain industrial and crop production.

Considering all essential lumber needs, the present outlook is that requirements this year will exceed the productive capacity of the mills. That explains Chairman Nelson's recent appeal to the industry to produce to capacity and his order freezing certain grades of softwood lumber. It explains also why further restrictions on non-essential civilian use of lumber may have to be imposed later. The immediate over-all problem is to bring production up to the month to month need for wood in all its war-using ramifications.

And there's the rub. No one appears to know what the mills will be able to produce under present operating conditions. Loss of mill and woods labor to the armed services and to other industries, tire and equipment shortages, adverse weather conditions, and other uncontrollable factors already have been responsible for a production decline since the first of the year of seven per cent. At the present time, the mills are said to be operating at a yearly rate of production of about thirty billion feet. The prospect is, therefore, that a thirty-two or thirty-three billion foot cut will be the maximum possible of attainment during 1942.

Whatever may be the vagaries of the situation, a question in many minds is—what does the war's widening call for wood mean as a drain upon the nation's forest resources? Space permits dealing with the question only in a broad and relative way. A lumber cut of thirty-three billion feet this year would compare to a lumber cut of thirty-six billion feet during the world war year of 1917. It would compare to an average yearly cut of thirty-seven billion feet during the prosperity decade 1920-1929 and to an average yearly cut of twenty billion feet during the depression decade of 1930-1939. These comparisons are valuable only to bring into perspective a lumber cut of thirty-three billion feet in relation to yearly lumber harvests during pre-war years.

A more meaningful figure is the growth taking place annually in our lumber woods. For trees of sawtimber size this has been estimated by the Forest Service at thirty-two billion feet which would make a 1942 lumber cut of thirty-three billion feet represent a net lumber drain of one billion feet. In addition to the lumber drain, there has to be taken into account the yearly drain upon trees of sawtimber size resulting from forest fires, insects and disease and from the cutting of pulpwood, veneer logs, cooperage stock, and other secondary products. These drains are estimated at around five billion and twenty billion feet, respectively.

Here arises a question as to the extent to which annual growth in our forests is being curtailed by expanded lumbering under war pressure and war prices. There is no doubt that these conditions encourage the cutting of small and fast growing trees and more destructive lumbering generally, particularly in regions where small mills rush in on a rising lumber market. On the other hand, an increased number of large mills today employ conservative cutting methods. The extent to which this and the growth of trees below sawtimber size are offsetting the effects of destructive lumbering is something for the foresters to determine.

Eliminating the many plus and minus factors which enter, and assuming the war will last two to three years longer, does a yearly over-cut of around twenty-five billion feet immediately threaten our supply of wood? Not if one considers the total amount of sawtimber standing in the United States exclusive of Alaska. This is estimated at 1763 billion feet. It does threaten, however, local forest reserves and quality species in many sections. And it challenges woodland owners and forest industry to speed up the elimination of destructive lumbering, government to step up its protection of the growing stock from fire, and foresters to begin planning and uniting on a program of forest land management that will meet post-war needs and bring the nation's forest budget into closer balance immediately the war is over.

CHESTNUT OAK

***Quercus montana*, Willdenow**

BY G. H. COLLINGWOOD

Maryland State Dept. of Forestry

The trunk of Chestnut Oak may be tall and straight, or divided into large ascending limbs, with spreading branches that form a broad open head

CHESTNUT OAK is found from southern Maine westward through Ohio and southern Indiana and southward through Kentucky and Tennessee to northeastern Mississippi and Georgia. It is most abundant on the Appalachian hills from southern New York to Georgia and Alabama, and reaches its largest size on the lower slopes of the Carolinas and Tennessee. An exceptionally large specimen is the "Washington Oak" on the east bank of the Hudson River near Fishkill, New York, under which Washington used to mount his horse when he went from headquarters on the west bank of the Hudson to the army encamped at Fishkill. This tree is seven feet in diameter and its estimated age is eight hundred to a thousand years.

Although chestnut oak is generally associated with dry soil and sandy, rocky ridges, it frequently grows on rich well-drained soil close to the banks of streams. It is usually sixty to seventy feet tall with a trunk two to three feet in diameter, but sometimes reaches a hundred feet in height with a trunk six to seven feet in diameter. On rocky ridges and dry mountain slopes chestnut oak has a scrubby form about twenty or thirty feet tall with a trunk eight to twelve inches in diameter. The trunk usually divides into several large limbs not far from the ground to give the tree an open irregular spreading head.

Sometimes this tree is called rock oak or mountain oak because it grows on high, rocky slopes, but its more common name, chestnut oak, refers to its leaves which are similar to those of the chestnut except that they are scalloped or wavy on the edge instead of sharp-toothed. It belongs to the white oak group in the family *Fagaceae*, which includes all the oaks, the beech, and the chestnut.

L. W. Brownell

The leaves, five to nine inches long and one and a half to four inches wide, are narrowly oval in outline with coarsely scalloped margins, wedge-shaped or rounded bases, and tapering tips. They are shiny yellow-green above, pale green and hairy below, and turn dull yellow or yellow-brown in autumn. They have short stems one half to one inch long, stout yellow midribs, and ten to sixteen pairs of conspicuous straight primary veins.

The bright rich-brown acorns of the chestnut oak are borne singly or in pairs on short stout stems. They are one to one and a half inches long and five-eighths to one inch thick. The

acorns are inclosed to about half their length by thin, rough, scaly cups. The white, sweetish kernels are eagerly eaten by squirrels. Large acorn crops occur irregularly at infrequent intervals, and prefer deep humus for germination.

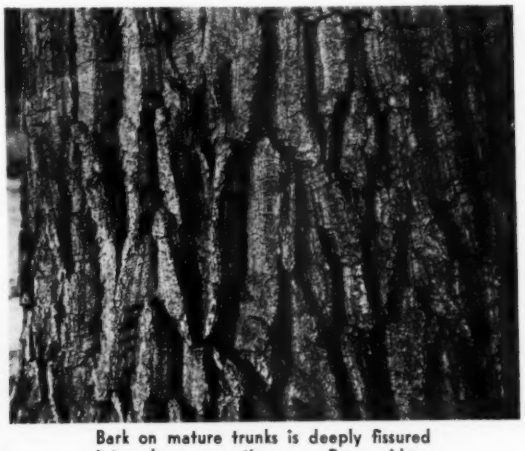
The stout twigs, green with a purple or bronze cast when they first appear, are light orange or reddish brown the first winter and turn dark gray or brown the second year. The smaller branches have thin, smooth, purplish brown bark. The trunk and large limbs have thick nearly black bark, rich in tannin, and it is divided into broad scaly ridges.

Leaves somewhat resemble those of chestnut and the acorns which mature in the first season are useful as food for wildlife

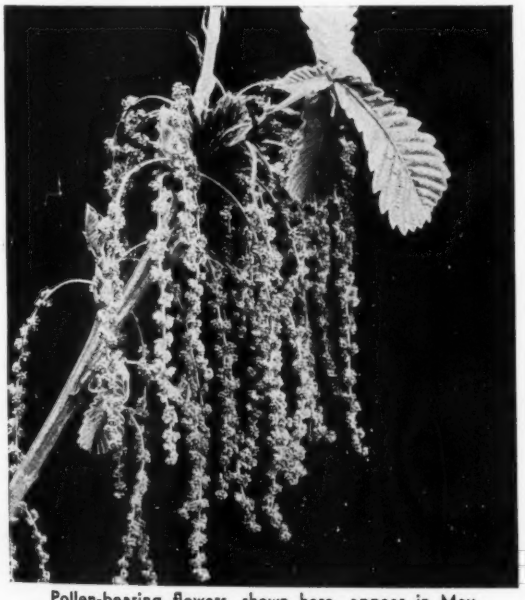
L. W. Brownell

The wood is hard, strong, tough, and close-grained. A cubic foot when dry weighs nearly forty-seven pounds. It is a hardy, windfirm tree, and although its wood is not as valuable as that of white oak, it is durable in contact with the soil, and is useful for ties, fencing material, mining props, and other rough products.

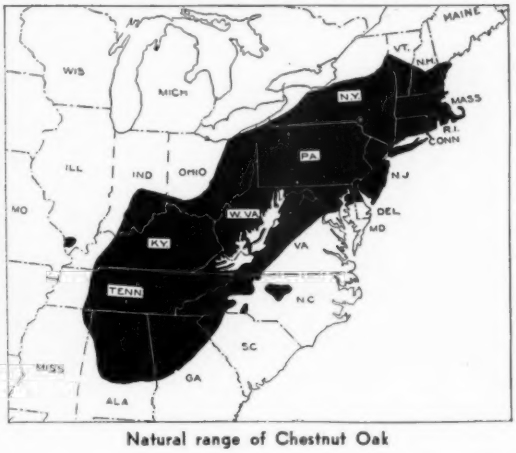
Chestnut oak requires much light, especially as it grows older. Its root system is adaptable; where the soils are deep the tap root is long; in rocky or shallow soils the lateral roots are strongly developed. Repeated fires reduce sprouting vitality, but the thick bark is a protection against fire.



Bark on mature trunks is deeply fissured into long, continuous, firm ridges



Pollen-bearing flowers, shown here, appear in May or June with the acorn-producing ones which are small, and grow from the base of leaf-stems



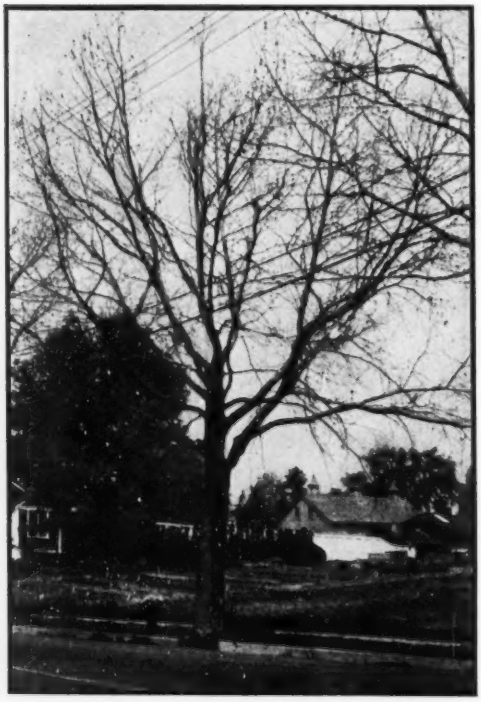
Natural range of Chestnut Oak

YOUR SHADE TREES:

By P. P. PIRONE

SMOKE, SOOT, AND GAS DAMAGE

BECAUSE city air will contain greater amounts of impurities as the tempo of war production increases, arborists and home owners will find it increasingly difficult to keep city trees in good vigor. Factory smoke often contains ingredients that are toxic to leaves. The most harmful fraction in smoke from coal is sulfur dioxide gas which reacts with moisture to form sulfurous acid, which in turn is immediately oxidized to sulfuric acid. The seriousness of this menace to trees is evident when one considers that sulfur dioxide has been known to injure vegetation in concentrations as low as two or three parts in a million parts of air, and that the daily average release into the atmosphere of New York City in 1924, when we were at peace, was computed by one investigator as close to 2,000 tons.



One of a row of London planes killed by escaping illuminating gas in the soil

Of susceptible trees, those growing closest to the source of the gas are generally injured most severely. Leaves exposed to low concentrations of sulfur dioxide become chlorotic and speckled with yellow and brown. High concentrations cause brownish-red or yellow areas between the leaf veins, and on some leaves discoloration also of the margins or tips, symptoms which, though somewhat typical, might easily be confused with damage due to such factors as prolonged drought and nutrient deficiencies. The tips, bases, or centers of the needles of coniferous trees first turn red, then the needles turn brown completely and drop off, especially when the gas concentration is high or when gas is present over a long period. This may be responsible, in part, for the difficulty of maintaining evergreen trees in large cities.

Though not so toxic as sulfur dioxide, soot, the solid residue of smoke, very often causes extensive injury. This material slowly settles on the leaves and finally coats them completely. Here the damage results not from clogging of the stomata, or breathing pores, as some believe, but from the screening out of sunlight. The sharp reduction in light reduces the capacity of the leaf to manufacture food, and consequently results in a serious impairment of the general vigor of the tree. Because the leaves of evergreens remain attached throughout the year, and in some species for several years, a considerable deposit may accumulate and thus greatly reduce the chances of survival of such trees.

Trees vary considerably in their tolerance for smoky atmospheres. Ailanthus, ginkgo, and Carolina poplar seem to withstand such conditions best. Unfortunately, both ailanthus and Carolina poplar have some very severe shortcomings which make them highly undesirable for street or city plantings. London plane, pin oak, Norway maple, white mulberry, linden, and tulip show decreasing tolerance in the order mentioned. Many of these have other highly desirable properties and are commonly planted in cities.

Toxic gases in the atmosphere may harm vegetation indirectly as well as directly. The acidity of the soil may increase as a result of the interaction between acid gases and the lime particles in the soil. Such a change not only reduces the population of certain beneficial soil bacteria, but also decreases the activity of others.

Obviously, one way to reduce injury from smoke is to eliminate the produc-

This red maple shows die-back of branches resulting from a slow gas leak

tion of the most harmful constituents at their source. Sulfur dioxide, for instance, can be removed before it is expelled with the smoke, either by converting it to sulfur or to ammonium sulfate. If the toxic gas and soot are not removed, injury can be reduced by raising the height of the smoke stacks. These suggestions actually were carried out in some instances during peace times. They cannot be considered seriously now because our factories will get priority rating on smoke and gas production for the duration, regardless of any possible damage to nearby trees. Under these circumstances, the best solution is to use trees in future plantings that are known to be most tolerant to impurities in the city atmosphere. In addition, injury to evergreen trees by soot deposits can be minimized by spraying with a soapy solution followed by syringing with clear water. A material known as "Calgon,"—sodium hexameta-phosphate—also can be used to remove soot from broad- and narrow-leaved evergreens.

A good method of testing for gas is to insert a potted tomato plant in a hole near the suspected leak. The pot at the left shows a normal plant, while the one at the right, with its sharply downbent branches, has been subjected to gas for twenty-four hours

Illuminating Gas Injury

Many tree roots are damaged and even killed by illuminating gas. This usually escapes from leaks in mains near the roots, although it has been known to travel as far as 2,000 feet from the leak.

The striking increase in the reported number of gas-injured trees in recent years has been attributed to faulty construction with improper caulking of the joints, to breaking of pipe due to blasting or other jarring work in the vicinity, or merely to aging of the gas mains, which thus naturally become more subject to leakage. Doubtless the number of cases of gas injury will increase sharply if enemy bombs fall in our cities.

The injurious fraction in manufactured illuminating gas is believed to be hydrogen cyanide, which forms hydrocyanic acid in water solution. In addition to the hydrogen cyanide, some damage is believed to result from suffocation by replacement of the normal soil oxygen by the various constitutents of the gas.

The effects of gas toxicity are most noticeable when the tree is in leaf. The symptoms vary greatly with the species of tree, the amount and type of escaping gas, the kind of soil, and the character of the surface cover. As with sulfur dioxide injury to foliage, illuminating gas damage may also be confused with other troubles.

When the tree is exposed to large amounts of gas, the most striking symptom is the sudden wilting and browning of all the leaves, followed by browning and death of the twigs and branches. Where the flow of illuminating gas is slow, these symptoms appear gradually over a period of a year or two. They may appear even after the leak is repaired. In such cases gas injury is seldom suspected. The woody portion of the smaller roots in some trees may turn bluish-black after long exposures to the gas. This characteristic is not constant, however, since other agents may cause similar discoloration.

Some trees exhibit additional and striking responses when the roots are subjected to illuminating gas. For example, long narrow cankers appear near the trunk base of London planes. The inner bark tissues in the cankered area become water-soaked, swollen, and, most striking of all, distinctly watermelon pink. The inner bark of Carolina poplars subjected to gas also increases in thickness and appears water-soaked, but undergoes no striking change in color.

Determination of Gas Leaks

Where gas is escaping in considerable quantity, the characteristic odor can usually be detected in the air near the injured tree. Lesser amounts can often be detected by smelling the air in holes dug to a depth of twelve to twenty-four inches or by using special gas-detecting apparatus.

In many instances, however, gas is present in concentrations too low to be detected by man or machines, but still high enough to cause injury. A simple test has been developed that can be made without scientific instruments and that conclusively demonstrates the presence of such minute quantities of illuminating gas in the soil. This test is based on the fact that the tomato plant is very sensitive to certain fractions in manufactured illuminating gas and shows a characteristic response to amounts considerably below that necessary to injure tree roots.

If the weather is warm enough (60° F. or above) for growth, a potted tomato plant is placed in a post hole dug two to three feet into the ground nearest the location of the suspected leak. The hole is then covered by a wooden board, the top made as nearly air-tight as possible, and the plant left in place for twenty-four hours. If gas is present, even in minute quantities, the tomato stems will bend sharply downward instead of maintaining their normal erectness. The downward bending does not result from wilting, but is a growth response to the ethylene fraction in the gas.

Treatment of Gas-Injured Trees

Gas-injured trees can usually be saved if the leak is detected early or if the flow of gas has been rather slow. First the leak must be repaired by the gas company, as quickly as possible. A trench is then dug on the side of the tree nearest the leak and the soil aerated as thoroughly as possible. Forcing compressed air into the soil speeds the removal. Because the water-soluble constituents are usually most toxic, large quantities of water should then be applied. Severely injured roots should be pruned and painted to prevent rapid decay of the wood. Following such treatments, the soil should be replaced and the entire root area fertilized to stimulate new top and root growth.

Where trees have been killed by high concentrations of gas, the best procedure is to repair the leak, remove the trees, and aerate the soil for several months. If new trees are to be replanted immediately, probably the safest—though the most expensive—procedure is to remove the soil and replace it with fresh soil.

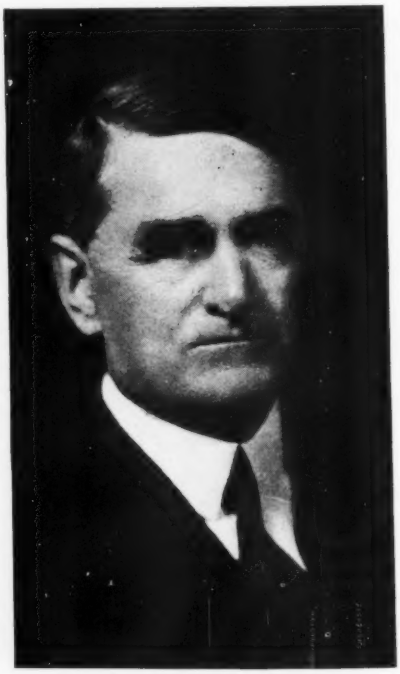
COLONEL JOSEPH HYDE PRATT, OF NORTH CAROLINA, DIES

COL. JOSEPH HYDE PRATT, consulting engineer and former state geologist and professor of geology at the University of North Carolina, died at his home at Chapel Hill on June 2nd. His loss will be keenly felt by his many professional associates as well as his personal friends, for he was widely known and loved.

A staunch supporter of the work of The American Forestry Association, Col. Pratt was first elected to its Board of Directors in 1923 and served for thirteen years. A practical conservationist and one of its ablest directors, he was not only faithful in attending meetings, —often at great discomfort to himself— but he brought to bear on the work of the Board a keen and sympathetic understanding and a rich experience it will be difficult, if not impossible, to replace.

Of old New England ancestry, Col. Pratt was born in Hartford, Cennecticut, on February 3, 1870. One of his forbears was John Pratt of Stevenange, Hertfordshire, England, who founded the family here—coming to America in 1632. He settled in Hartford in 1636 and was one of the Rev. Thomas Hooker's party.

From boyhood, Col. Pratt's interest lay along scientific lines and led eventually to his distinguished career as a mineralogist and geologist. Graduated from the Sheffield Scientific School of Yale in 1893, he stayed there—instructing in mineralogy — until 1897, when he was appointed by North Carolina as mineralogist and lecturer in science. Joining the United States Geological Survey in 1901, he remained with it until 1910, when he returned to North Carolina as State Geologist. During his subsequent career as an independent consulting engineer, Col. Pratt examined mines and mineral lands in Canada, Mexico and Cuba, and in over thirty states. His professional experience rated him an expert in drainage of swamp lands, conservation of forests and the building of highways in North Carolina, where he created the State Highways and Fisheries Commission. He was awarded the honorary degree of A.M. in 1923, and wrote voluminously on the subjects of mineralogy and the mining industry, reclamation and pollution. His broad human interests are indicated by the fact that he was Director of the North Carolina Conference, and he was active in many national, state and local sociological, scientific and professional bodies.

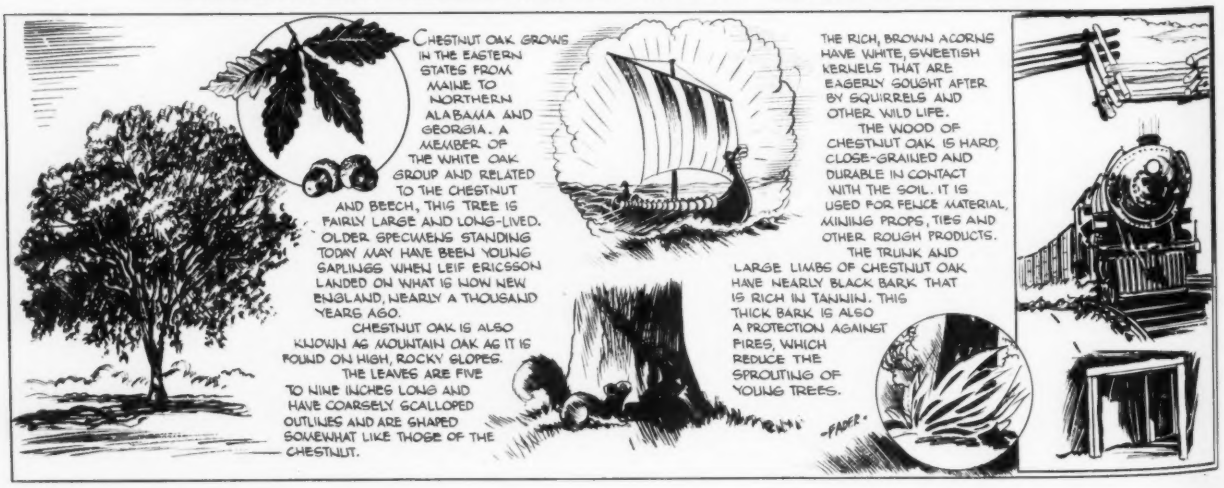


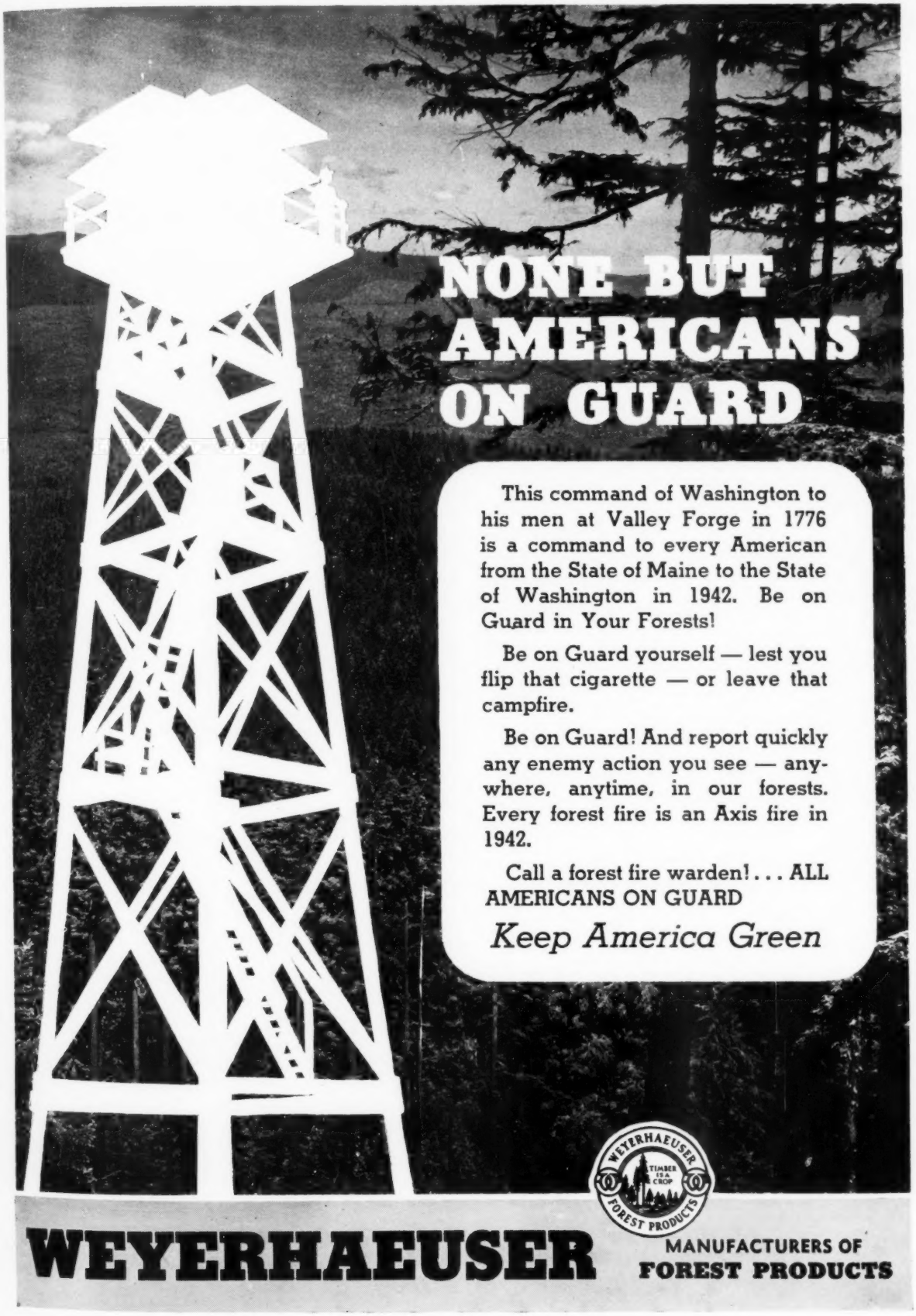
Col. Joseph Hyde Pratt
1870—1942

Aside from his scientific work, Col. Pratt had a military record to be proud of. A member of the Connecticut National Guard, he was commissioned Colonel of Engineers in that body in 1913, and when the United States entered the World War, he was commissioned Major in the Engineer Corps of the United States Army. He was given command of a battalion, which later became the First Battalion of the 105th Engineer Regiment. Promoted Lieutenant Colonel in 1917, his regiment went overseas in 1918 with the 30th Division, serving first with the British Army in Flanders and later with the 2nd American Corps in the Somme sector. Commander of the regiment, July, 1918, to May, 1919, he was commissioned Colonel in October, 1918. Col. Pratt was especially commended for his efficiency in providing light railways for the transportation of food and ammunition supplies for the 2nd American Corps during the Somme offensive. His regiment received official praise for fearlessness under fire, and he was awarded the Distinguished Service Medal.

Col. Pratt made his home at Chapel Hill, in North Carolina. Outdoor recreation and stamp collecting were his hobbies. An enthusiastic camper, he spent much time in the woods and mountains. He is survived by his widow, Mrs. Harriet White Pratt; one son, Dr. Joseph Hyde Pratt, Jr., of the Mayo Clinic at Rochester, and two stepsons, Horace Peters, of Baltimore, and Joseph Peters, of Philadelphia, now with the Army Air Corps at Kansas City.

TREES AND THEIR USES—No. 66—CHESTNUT OAK


CHESTNUT OAK GROWS IN THE EASTERN STATES FROM MAINE TO NORTHERN ALABAMA AND GEORGIA. A MEMBER OF THE WHITE OAK GROUP AND RELATED TO THE CHESTNUT AND BEECH, THIS TREE IS FAIRLY LARGE AND LONG-LIVED. OLDER SPECIMENS STANDING TODAY MAY HAVE BEEN YOUNG SAPLINGS WHEN LEIF ERICSSON LANDED ON WHAT IS NOW NEW ENGLAND, NEARLY A THOUSAND YEARS AGO.
CHESTNUT OAK IS ALSO KNOWN AS MOUNTAIN OAK AS IT IS FOUND ON HIGH, ROCKY SLOPES.
THE LEAVES ARE FIVE TO NINE INCHES LONG AND HAVE COARSELY SCALLOPED OUTLINES AND ARE SHAPED SOMEWHAT LIKE THOSE OF THE CHESTNUT.
THE RICH, BROWN ACORNS HAVE WHITE, SWEETISH KERNELS THAT ARE EAGERLY SOUGHT AFTER BY SQUIRRELS AND OTHER WILD LIFE.
THE WOOD OF CHESTNUT OAK IS HARD, CLOSE-GRAINED AND DURABLE IN CONTACT WITH THE SOIL. IT IS USED FOR FENCE MATERIAL, MINING PROPS, TIES AND OTHER ROUGH PRODUCTS.
THE TRUNK AND LARGE LIMBS OF CHESTNUT OAK HAVE NEARLY BLACK BARK THAT IS RICH IN TANNIN. THIS THICK BARK IS ALSO A PROTECTION AGAINST FIRES, WHICH REDUCE THE SPROUTING OF YOUNG TREES.
FADER


NONE BUT AMERICANS ON GUARD
This command of Washington to his men at Valley Forge in 1776 is a command to every American from the State of Maine to the State of Washington in 1942. Be on Guard in Your Forests!
Be on Guard yourself — lest you flip that cigarette — or leave that campfire.
Be on Guard! And report quickly any enemy action you see — anywhere, anytime, in our forests. Every forest fire is an Axis fire in 1942.
Call a forest fire warden!... ALL AMERICANS ON GUARD
Keep America Green
WEYERHAEUSER
TIMBER IS A CROP
FOREST PRODUCTS
WEYERHAEUSER
MANUFACTURERS OF
FOREST PRODUCTS

DEATH CLAIMS E. T. ALLEN, PIONEER FORESTER

EDWARD TYSON ALLEN, veteran forest administrator and economist, and father of cooperative forest protection in America, died May 27 at Portland, Oregon. He was sixty-seven years old.

Exemplifying the pioneer spirit of his profession, Mr. Allen was one of the first federal forest rangers, drew up the first timber sale contract, and, with Filibert Roth, wrote the first manual of forest reserve administration. The U. S. Forest Service emblem and badge still in use was designed by him. He was also a charter member of the Society of American Foresters.

Born in 1875 in New Haven, Connecticut, he accompanied his father, O. D. Allen, a professor at Yale, to California in 1885, and in 1889 to the wilderness at the foot of Mt. Rainier, Washington Territory, sixty miles from any town or wagon road.

E. T. ALLEN
"Father of Cooperative Forest Protection"

After a backwoods boyhood he became a newspaper reporter and, in 1898, one of the first federal forest rangers. In 1899 he entered the old Division of Forestry, studying western trees, and in 1901 wrote a monograph on western hemlock. He was borrowed by the Secretary of Interior in 1901 to inspect and reorganize forest reserve administration throughout the West for two years, during which he drew the first timber sale contract and assisted in the writing of the first manual of reserve administration. He returned to the Bureau of Forestry to assist in the examination of lands to extend the reserve system and participated in reorganization of the system by the Forest Service.

In 1905 he resigned to become the first state forester of California, with permission also to serve the government as its first national forest inspector in that state. He resigned a year later to return to national forest administration in Oregon and Washington and to become in 1908 the first district forester for these states and Alaska.

In 1909 he resigned that office to organize an alliance and clearing house to promote cooperation of all private, state and federal forestry effort in Idaho, Washington, Oregon, Montana and California, which was later called the Western Forestry and Conservation Association and now represents, in private and state forest protection alone, the safeguarding of millions of acres. With private protective organizations then existing in the two first-named states only, he extended it to the other three and promoted legislation to perfect state forest codes. He was the author of the bill creating Oregon's representative board system, recognizing all the allied interests, and of much other early Pacific Coast forest legislation.

For the service of all agencies in the five Northwestern States it was necessary to build up, without precedent, an elaborate system of information exchange and field manuals of forest fire-control technique, improvement construction, equipment development and purchasing, fire reports and statistics, and educational publicity.

Not to neglect other forestry problems, Mr. Allen added research in reforestation and operation methods, with service to progressive operators. Committees and annual forest management conferences became the official machinery for all private and public agencies with western forest responsibilities in reaching coordinated policies and methods.

Mr. Allen's work extended to the national conservation congresses of thirty years ago, tax-reform movements, the Federal Trade Commission, and like contacts with general forest affairs. He became forestry counsel for the National Lumber Manufacturers Association, a member of the Lumber Committee of the Council of National Defense, a neutral advisor between forest industry and the Treasury Department when the income and excess profits tax system was evolved, and an active agent in the framing, passage and application of the Clarke-McNary law.

THIS . . .

WE, the undersigned, hold that in the forest field the most important line of action is the protection of forests and related resources against the impending dangers of forest fires. The danger is acute because in addition to normal forest fire hazards, there is the probable danger of aerial bombing and ground incendiarism.
FOR years we have been supplying Forest Protective Agencies with fire fighting and protection equipment. Much of our efforts are now directed toward war production, but we take this opportunity to reaffirm our desire to reduce forest fire losses and to offer our assistance to Forest Protective Agencies in every way possible. Write us if we can be of service.

The Council Tool Company
Wananish, North Carolina
Fire Rakes, Hoes, Bush Axes

Pacific Marine Supply Company
Seattle, Washington
PACIFIC Pumpers

D. B. Smith & Company
Utica, New York
INDIAN Fire Pumps

Panama Pump Company
Hattiesburg, Mississippi
PANAMA Booster Pumps

Hercules Equipment & Rubber Co.
550 3d St., San Francisco, Calif.
INDIAN Fire Pumps
Hercules Roller Pumps

Ingersoll Steel & Disc Division
Borg-Warner Corporation
New Castle, Indiana
INGERSOLL Shovels

Fayette R. Plumb, Inc.
Philadelphia, Pennsylvania
PLUMB Axes

Hester Plow Company, Inc.
Jacksonville, Florida
HESTER Fire Line Plows

Warren Axe and Tool Company
Warren, Pennsylvania
Sager Axes — Bull Dog Tools

The Union Fork and Hoe Co.
500 Dublin Ave., Columbus, Ohio
Forestry Tools

OR THIS . . .

YOUR INVITATION TO MEMBERSHIP

We extend to you a cordial invitation to participate in the wartime program of The American Forestry Association which, briefly stated, includes:

1. **Protection of forests and related resources against the impending danger of forest fires.**
2. **Maintenance of a continuous production of wood and other forest products essential to the prosecution of the war.**
3. **Accelerated research in the use and production of cellulose, plywood, lumber and other forest products related to war needs.**
4. **Expansion of conservation education.**

AMERICAN FORESTS IS SENT MONTHLY TO MEMBERS

The American Forestry Association,
919 - 17th St., N. W., Washington, D. C.

I hereby apply for membership in The American Forestry Association and enclose $.....

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U. S. WILL DRAW ON ALASKAN SPRUCE

TO meet the growing demand for Sitka spruce, wood par excellence for the building of airplanes, the Department of Agriculture is launching an undertaking that will involve the bringing of spruce logs from Alaska to Puget Sound mills for manufacture into airplane stock. Early in June the Secretary of Agriculture approved an agreement between the Forest Service and the Commodity Credit Corporation under which the Forest Service, acting as a corporation agent, will be provided funds for the undertaking. The project will be conducted by the Forest Service, with Frank E. Heintzleman, regional forester of the Alaska region, in general charge, assisted by Charles G. Burdick and J. M. Wyckoff, both long-time members of the Alaskan Forest Service.

The Commodity Credit Corporation, it is understood, has provided the Forest Service with a revolving fund of $2,500,000 to cover operating costs of the enterprise. The logging of some 10,000,000 feet of spruce timber monthly and its transportation to Puget Sound is contemplated. Two major operations are involved: (1) The logging of the timber in the southwestern part of the Tongass National Forest, which is in southeastern Alaska, and (2) the towing of the logs in large rafts from Alaska to the Puget Sound mills. Only spruce trees suitable for airplane lumber will be selected for logging. This means that only the larger and higher quality trees are to be cut.

Under the agreement the Commodity Credit Corporation will buy the stumpage from the Forest Service, and the regional officers of that Service will contract the logging and towing to independent logging concerns. When the rafts of logs reach Puget Sound, they will be offered for sale by bid to mills which specialize in the cutting of spruce airplane stock. It is pointed out that towing logs from Alaska to Puget Sound—a distance of almost 1,000 miles—is necessary because of the few Alaskan sawmills capable of handling the large Sitka spruce logs.

THE COVER

This month's cover of AMERICAN FORESTS reproduces a remarkable photograph — the work of Mr. James MacGillivray and his children, of Oscoda, Michigan. In and around the picture is an equally remarkable story of wildlife friendship which Mr. MacGillivray tells elsewhere in this issue.

Some there may be who will assume that the photograph partakes of superimposed make-up. But Mr. MacGillivray writes: "Day after day, the children posed the eagles in front of a large flag in the yard, and the waving of small flags or the bark of our dog would incite them to belligerent poses. The cut is from an actual photograph in its entirety. It was enlarged from a frame of my motion picture by Harry S. Hood, Keith Theater Building, Philadelphia."

But for the full story read "The Eagles of Oscoda," on page 298.

FOREST TREES REQUIRE SOIL FERTILITY

THAT forest trees, like any other crop, may be suffering from deficiencies of nutrients in the soil is not commonly appreciated. As an accommodation of the native vegetation to lowered levels of soil fertility, nature provides plant successions whose substance is successively more of woodiness. The succeeding variety is made more of weather and less of soil. It does not follow, however, that even a crop of wood can be made without taking some of the fertility from the soil. This fact is being forcefully demonstrated with black locust trees by the soil conservationists in a project on the Don Parkinson farm near Harrison, Arkansas.

Four years ago the locust trees of switch size were set in rows on the contour at regular intervals and regular row spacings, six by six feet. One plot of a series of rows was given a mere sprinkling of thirty-two per cent superphosphate during the first growing season. No fertilizer applications have been made since. The adjoining plot received the same soil cultivation and contour arrangement but was given no superphosphate.

Today even a casual observer driving down the road toward the project will note the much better growth of the treated trees. The stand of trees, their top growth, their trunk dimensions and the forest floor, all exhibit interesting differences as a result of the small addition of nutrients in the form of ordinary thirty-two per cent superphosphate during their first growing season. Where no fertility was added, about half of the trees are missing, while on the other plot almost every tree has survived.

The growth at this time shows a difference of two to one in the mass of top and in the diameter of the trunk in favor of the soil treatment. With no treatment, the canopy is so scant that the entering

light is sufficient for a mass of weed vegetation to occupy the area. Where phosphate was used, the canopy is already dense enough to prohibit undergrowth and give the customary forest floor of cumulative and decaying leaf litter.

In dealing with the black locust, it is well to remember that this tree is a legume. It serves as help for other trees as it drops its leaves to give them some of the nitrogen that came from the air. Locust trees are the soil builders of the forest, just as other legumes like sweetclover and soybeans are the soil builders among the forages. Locusts, however, can be soil builders in only one respect—that of adding nitrogen as their plant parts are added to the soil. Still further, they can supply themselves with nitrogen from the unlimited supply of the air only when the soil delivers amply the other ten nutrient items that come from this more scant supply.

As the forage legumes, such as alfalfa and sweetclover, require calcium and phosphorus, so this forest tree legume, the black locust, is improved on Arkansas soils by the addition of calcium and phosphorus delivered by the superphosphate. Before asking the locust to replenish soils that are depleted to the degree where forest crops are their only hope for production, it is evident that we must give them help in the form of calcium and phosphorus. Soil treatments must be used if the tree legumes are to be effective forest rebuilders just as we now know that forage legume crops on most of the humid soils require lime and phosphate if they are to fix nitrogen and fulfill hopes of soil rejuvenation.—WILLIAM A. ALBRECHT.

MARYLAND NAMES KAYLOR FORESTER

JOSEPH F. KAYLOR, senior forester for the United States Forest Service since 1936, was on June 1 named state forester of Maryland to succeed F. W. Besley, who retired in March.

A native of Pennsylvania, and a graduate of the Pennsylvania State Forestry School at Mont Alto, Mr. Kaylor first became associated with the Forest Service in 1934, after serving as assistant state forester of Indiana. He was assigned to shelterbelt work in the Dakotas, Nebraska, Oklahoma and Texas. Following this he became associated with the Tennessee Valley Authority, returning to the Forest Service in 1936 as senior forester, stationed in Washington, D. C.

Mr. Besley at the time of his retirement had served Maryland as state forester for thirty-six years — a record for the longest continuous service of any state forester in the United States. For eighteen years of this service he was a director of The American Forestry Association.

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CONSERVATION IN CONGRESS

FOR want of three votes, an increase in emergency forest fire control funds was rejected by the House of Representatives on June 9, when the conferees reported the Department of Agriculture Appropriation bill to that body. The vote followed a long discussion on the need of increased fire control funds to meet critical emergencies which may arise this summer. The majority of the speakers supported the increase, but the fact that the House conferees opposed it appears to have been the deciding factor. Nevertheless, the item went down to defeat by the close vote of 174 to 171, with eighty-five members not voting.

Fire Control Funds Rejected

As reported last month, the Senate passed the Department bill on May 20, with an increase in the fire control appropriation of $5,500,000. This was in two items: one of $3,000,000 for protection of national forest timber and one of $2,500,000 for protection of state and private timber under the Clarke-McNary Act. Following passage, the bill went to a conference committee of the two houses for adjustment of differences. The House conferees refused to accept the Senate increase and reported the bill back to the House with the fire control item bearing its opposition. Discussion first centered on the increase of $3,000,000 for national forest protection, and when the opposition of the House conferees was supported by the vote given, the second increase of $2,500,000, under the Clarke-McNary Act, later was also rejected by voice vote.

The House action does not necessarily end the fight for increased fire control funds. Refusal of the House to accept these and other Senate increases sent the bill back to the conference committee where there is still a chance that Senate and House representatives may agree, or at least effect a compromise.

CCC Death Warning

In the House, also, the Civilian Conservation Corps received what may be its death warning, when the bill providing appropriations for the Federal Security Agency was under consideration. The bill had been reported to the House by the Committee on Appropriations with all funds for operation of the CCC stricken out, although the President and the Bureau of the Budget had recommended $49,101,000. Two or three days' debate on the question of whether both the CCC and the NYA should be completely liquidated raged back and forth between defenders of the agencies and their opponents. When the issues came to a final vote on June 5, the committee's recommendation to terminate funds for the CCC was adopted. The NYA, however, was saved by the House voting a continuing appropriation of approximately $50,000,000, which is one-half of the amount requested by the NYA for the continuation of its war production training program. To close up the CCC as soon as possible after June 30, the House voted a liquidating fund of $500,000. The above action does not necessarily mean the fate of the CCC is sealed. From the House the bill went to the Senate where it is understood that Administration forces will make a determined effort to restore to the bill a continuing appropriation.

Wildlife Appropriations Improved

Wildlife conservationists were gladdened by the action of the Senate late in May in restoring the drastic cuts which the House had made in appropriations for the Fish and Wildlife Service, when the Appropriation bill for the Department of the Interior was before it. As passed by the House, operating funds for the Fish and Wildlife Service had been cut to $5,547,110. The Senate upped the appropriation to $7,441,615, thereby restoring over a million and a half dollars. Included is restoration of a million dollars for the Pittman-Robertson Federal Aid Project, $71,550 for research in food habits of birds and animals, and $100,000 for biological investigations at the Patuxent Wildlife Refuge and at ten cooperative research units.

Destruction of War Material

An amendment to the Act of April 20, 1918 "to punish the willful injury or destruction of war material, or of war premises or utilities used in connection with war material, and for other purposes," was introduced in the House on May 27 by Representative Fulmer of South Carolina. It reads as follows:

"That the words 'war material,' as used herein shall include arms, armament, ammunition, livestock, forest products and standing timber suitable therefor, stores of clothing, food, foodstuffs, or fuel; and shall also include supplies, munitions, and all other articles of whatever description and any part or ingredient thereof, intended for, adapted to, or suitable for the use of the United States or any associate nation, in connection with the conduct of war."

CONSERVATION CALENDAR

Important Bills in Congress With Action May 14 - June 10, 1942

BILLS ENACTED

H. R. 1595—ENGLEBRIGHT—To authorize the addition of certain lands to the Plumas National Forest, California. Passed House October 21, 1941. Passed Senate May 27, 1942. Signed by the President June 5, 1942.

H. R. 4733 — FULMER — To add certain lands to the Boise National Forest, the Salmon National Forest and the Targhee National Forest in Idaho. Passed House July 7, 1941. Passed Senate May 27, 1942. Signed by the President June 5, 1942.

APPROPRIATIONS

H. J. RES. 324—Making appropriations for work relief and relief for the fiscal year ending June 30, 1943. Introduced June 8, 1942. Reported by the Committee on Appropriations (Report No. 2219), June 9, 1942. Under consideration in the House June 10, 1942.

H. R. 6709—TARVER—Making appropriations for the Department of Agriculture for the fiscal year ending June 30, 1943. Passed House March 13, 1942. Amended and passed by the Senate May 20, 1942. In conference May 25, 1942. Conference report submitted in House June 9, 1942.

H. R. 6843—JOHNSON, Oklahoma—Making appropriations for the Department of the Interior for the fiscal year ending June 30, 1943. Passed House March 30, 1942. Passed Senate, amended, May 26, 1942. In conference June 4, 1942.

H. R. 7181 — HARE — Making appropriations for the Department of Labor, the Federal Security Agency, and related independent agencies for the fiscal period ending June 30, 1943. Passed House June 5, 1942. Referred to the Senate Committee on Appropriations June 8, 1942.

GOVERNMENTAL FUNCTIONS

H. R. 7141—FULMER—To amend the Act of April 20, 1918, as amended, entitled "An Act to punish the willful injury or destruction of war material, or of war premises or utilities used in connection with war material, etc." Introduced May 27, 1942. Referred to the House Committee on the Judiciary.

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CONSERVATION DIRECTOR OF WISCONSIN DISMISSED

H. W. MACKENZIE, conservation director of Wisconsin for the past eight years, was summarily voted out of office by the state conservation commission at a special meeting held in Oshkosh on May 19. The dismissal became effective June 1.

The action of the commission came as a thunderbolt to Mr. MacKenzie and to the people of the state in that no charges had been preferred against the director and no indication given that the action was contemplated. It was accomplished by the vote of four members of the commission, Messrs. Catlin, Adams, Rahr and Dickinson over the vigorous protest of W. J. P. Aberg, chairman, and James Corcoran, who charged that the opposition to Mr. MacKenzie stemmed from the governor's office.

A reading of the minutes of the commission's stormy session reveals that Mr. MacKenzie was ousted not only without charges having been preferred against him but without opportunity to defend himself. The meeting, it appears, was forced by opposing members and immediately upon it being called to order a motion was made by Mr. Adams, seconded by Mr. Catlin, to dispense with the conservation director as of June 1. No discussion of grounds for the action was held in advance of the motion but after it was made both Mr. Aberg and Mr. Corcoran, to whom the motion appears to have been a surprise, came to the defense of Mr. MacKenzie. Time and again Chairman Aberg pressed for charges against the director and appealed for an opportunity for him to be heard. In reply Mr. Catlin said: "I feel it is for the best interest of the State of Wisconsin now that this change be made and that is all that is necessary."

Chairman Aberg charged Mr. Catlin with being the prime mover to disrupt the commission and to depose Mr. MacKenzie. At one point in the discussion the minutes show him as saying: "By and large difficulties which have arisen on this board and in the department have been caused by Mr. Catlin; that is characteristic of him because he has done it before and he will do it again. Mr. Catlin has done more to wreck conservation in Wisconsin than all the decent forces on this commission can overcome and he is doing it now. * * *

"What has been going on in this commission is a fine example of un-Americanism. It isn't American tradition to condemn men and convict them without charges."

Notwithstanding the efforts of Messrs. Aberg and Corcoran to give Mr. MacKenzie an opportunity to defend himself, the motion to dismiss was passed by a vote of four to two. The deputy director, Ernest Swift, was made acting director pending selection of Mr. MacKenzie's successor.

NEW BOOKS

DU PONT — ONE HUNDRED AND FORTY YEARS, by William S. Dutton. Published by Charles Scribner's Sons, New York City. 396 pages. Price, $3.00.

The story of DU PONT is one that will occupy a unique place in America's industrial history. This book is the biography of a business, a family and a progressive nation. It is the story of men, of vision and venture, of labor, sacrifice and devotion to an ideal. The book opens by introducing Eleuthere Irenee du Pont de Nemours, refugee from a French dictatorship, who in 1802 settled on Brandywine Creek near Wilmington, Delaware, and by circumstance became a powder maker. Other interests occupied the mind of Eleuthere Irenee du Pont. During the first spring in America he concerned himself with sending plants and trees back to his home country with the hope that he could interest park authorities to restock the depleted French forests.

His interest in forestry was evident from the very beginning, but the manufacture of powder soon required all of his attention and in a few years the foreigner of 1802 and the homesick man of subsequent years who had wished hopefully for a position in the French Forestry Service had disappeared. He soon became intensely interested in the land of his adoption.

The second half of the book deals with the development not only of the Du Pont Company, but with many of the chemical industries which have comparatively recently come into prominence. These include among many others rayon, plastics, synthetic rubber and nylon.

AMERICAN WILD FLOWERS, by Cecil Hulse Matschat. Published by Random House, Inc., New York, N. Y. 28 pages. Profusely illustrated. Price, fifty cents.

This is a beautifully printed book, with color plates of many commonly found native wild flowers and text describing each plant. It will create an interest in nature among juveniles and should prove a valuable instruction medium for teachers and others entrusted with child guidance in this field of horticulture.

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The publications listed below must be ordered direct from the addresses as given and not through the Association.

Publications on Attracting Birds. Wildlife Leaflet No. 201, Fish and Wildlife Serv., U. S. Dept. of Int., Wash., D. C.

Preliminary Investigation of Oak Diseases in Illinois, by J. Cedric Carter, and *A Needle Blight of Austrian Pine,* by Robert L. Hulbary. Natural History Survey Div., Dept. of Registration and Education, Urbana, Illinois.

National Planning in Selected Countries, by Lewis L. Lorwin. Tech. Paper 2, National Resources Planning Board. Supt. of Docs., Washington, D. C. Price, 40 cents.

Production of Logs in Washington and Oregon, 1925-1940, by Herman M. Johnson. Products Paper No. 2, Pac. N. W. For. and Range Exp. Sta., 423 U. S. Court House, Portland, Ore.

Forest Type Map of Virginia. U. S. For. Serv., Appalachian For. Exp. Sta., Federal Building, Asheville, N. C. (This and similar previously issued maps for North Carolina and South Carolina available upon request.)

Yield Tables for Cut-Over Spruce-Fir Stands in the Northeast, by Marinus Westveld. U. S. Dept. of Agr., Northeastern For. Exp. Sta., New Haven, Conn.

Research—A National Resource. III. Business Research. Report of an Advisory Committee to the National Resources Planning Board. Supt. of Docs., Wash., D. C. Price, 20 cents (paper).

Lumber Industry Facts, 1941. Natl. Lumber Mfrs. Assn., 1319 Eighteenth Street, Wash., D. C. Price, 10 cents.

Federal Aid in Wildlife Restoration, by Albert M. Day. Fish and Wildlife Service, U. S. Dept. of the Int., Regulatory Announcement 2. Supt. of Docs,. Wash., D. C. Price, 5 cents.

PAPERJACKS' COLLEGE

(*Continued from page* 305)

nology. A problem that created much interest in the class was the possibility of a non-headache wrapping for dynamite sticks. Seems it is the fumes from dynamite-stick wrappers, after blasting, which cause headache and other ills. We learned that the problem appears to have been licked in a new wrapper, which was displayed and which is now being tested under varying conditions.

With a serious shortage of rubber, this year will see the first large-scale use of a new fire hose, made of nothing more than specially treated sheets of fibrous cellulose. Used last summer on forest fire work in the Pacific Northwest, it stood up well under hard con-

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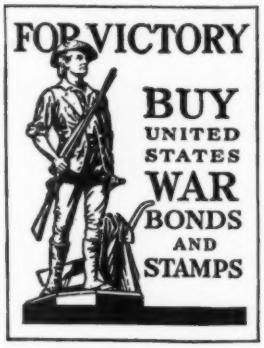

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ditions. It cannot be used a second time, but its cost is a fraction that of linen-rubber hose. Picked up after use, it can be repulped, just as old newspapers and other waste is reclaimed.

Speaking of rubber, one of its ingredients is carbon black, a difficult product to pack successfully for shipping and storage. Technician-professors at Camas have succeeded in recent weeks in producing an almost perfect paper (they never admit to perfection) for packaging carbon black, and the mill is running off a huge order of it.

Incidentally, when the West Coast had its first blackout orders last December, the vast Camas plant with its many large windows presented a problem. A machine was immediately put to work running off a tremendous roll of the blackest, most-opaque paper that can be made, and men and women had the acres of windows solidly blacked out within a few hours, to remain thus for the duration.

There is likely to be a shortage of jute for twine making. Next door to the Camas paper mill is a factory that is working feverishly making string, twine and ropes out of paper. Dean Natwick showed us some of its products, chief of which is twine for tying wool fleeces. Fibers of jute and cotton have shown a tendency to come off in the wool, but paper twine does the job without shredding. With more than 57,000,000 sheep due for shearing in the United States this spring, one gets an idea of the amount of twine that will be used.

In closing his talk Dean Natwick brought up one of the oldest problems that have faced pulp and paper mills: What to do with the waste liquors remaining from pulping the wood? This waste contains lignin, of which we are sure to hear more and more as experiments with it go on and its wonders unfold.

When the evening class was over I remarked on the several young women enrolled. Were they planning to be technicians, or mill department heads? No, they were taking the course so that in their regular work as clerks, stenographers and secretaries they would know what the technical talk they heard and the technical letters they wrote and read really meant. I learned that one of the co-eds made the fifty-mile trip from Portland five nights a week in order to attend. Three or four other students are employed at the West Linn, Oregon, plant of the Crown Willamette Company, and they have a sixty-mile trip nightly.

The thing that struck me most after talking with the students and instructors was the eagerness with which they approached their school work—after their regular day's work was done. I felt the genuine enthusiasm they have in gaining a wide knowledge of pulp and paper. I have never seen such enthusiasm in a high school, a college, or a university, except in the matter of football, which Camas students ignore. These youngsters, yes, and their teachers, have an almost fanatical interest in their subject.

One of the graduates, Roy Miller, Camas '39, received one of the eleven Alfred P. Sloan Fellowships at Massachusetts Institute of Technology. Almost without exception graduates have gone on to better jobs than they held as students, some in the Camas mill, others in other plants of the wide empire of Crown Zellerbach, parent company of Crown Willamette.

Since the school's inception in 1933, 105 students have been graduated from the four-year course, 175 from the three-year, 315 from the two-year and 583 from the first-year course.

Because of the unmatchable facilities close at hand in the Camas plant, students are presented a much wider curriculum than would be possible at most universities; the knowledge they absorb by actual practice rather than from theory is the kind that sticks. Even their forestry doesn't come wholly from books, for among the interesting events of the school year are those days when students are taken a hundred or two hundred miles to view the forests where the Camas pulpwood comes from. Here they see the broad reforestation program carried on for years by the Crown Willamette Company. They see the second-growth timber, thousands of acres of it, growing on land that already has furnished one crop for the pulp mill and is now big enough for another harvest. This second-growth forest is nurtured as carefully as can be, threaded with fire trails, with fire breaks of green old timber, and guarded day and night during dry weather by sharp-eyed lookouts living in glass houses on mountain peaks.

"The two important ingredients in paper," Dean Natwick observed, "are water and wood. We are as certain as we can be of anything that we will always have ample supply of both."

When next March rolls around, another group of four-year graduates will line up on the Camas "campus," diplomas in hand, to have the class picture taken. The paperjacks, and the paperjills, too, get a kick out of this occasion. That part of the campus always picked for the class photograph has a background of huge storage tanks, but you'd never guess what they were. Each tank is a mountain of dark green ivy. "It is our concession to the Ivy League universities," Dean Natwick said.

THE EAGLES OF OSCODA

(*Continued from page* 301)

radius of the town's environs Bess would follow Pete through the air, keeping a short distance behind. If Pete went on a long journey, Bess would leave him after a brief flight and disconsolately await his return. When he again alighted on the fence, the crow would come down in close proximity and address him with an air of gabby gossip. And Pete would indicate polite attention by interspersing her gabble with interrogative "Cha-ahh's?"

This role of friend and protector seemed to be assumed by Pete and Molly for any bird, animal, or person accepted with display of favor by the children. As commendable as it was, however, it completely spoiled our plans to obtain dramatic pictures of an eagle pouncing on its prey. This is the way it happened.

Taking advantage of the birds' habit of dropping from high altitudes to take fish placed on a tree-stub feeding perch, the children developed a "big act." Within a week they had the eagles, in response to a shrill whistle, swooping down from the sky with startling velocity only to check their dive at the last moment and land lightly on a stout T-twig held in an upraised hand. This performance suggested the picture of one of the great birds diving on its prey, and a young rabbit was brought into the yard for the role of victim.

The children pleaded immunity for the rabbit as a pet, but nevertheless we decided to stage the drama. This decision was short-lived, however, for when the camera was made ready it was discovered that the rabbit, natural prey of the eagle, had joined the two great birds and the children, along with their pet dog and cat, in happy camaraderie. After that the cottontail was never in jeopardy, and often it would join the dog in romps with Pete and Molly.

We were soon to learn another interesting thing about eagles. We were to learn there is one bird that can put to rout an adult American eagle. It is the eagle's own progeny at a queer stage of fierce and avid immaturity.

Near us, in the shoals of the estuary sand-wash, where the famous Au Sable River enters Lake Huron, an army of gulls fish daily. Here, too, adult eagles come to partake of the minnows and fingerlings easily caught in the shallows. Watching through glasses, we would see the gulls vacate in panic at the approach of the wild eagles. Then, when the adult birds had full possession of the feeding area, we would release Pete and Molly. What happened after that was startling. The wild adult eagles would leave in flurried haste to escape the onslaught from the adolescent weight and fierceness of this amplified offspring of their kind. They would even drop fish they had secured in their haste to get away from the great black bodies—American eagles do not gain their white crest until they are three years old—of our young back yard pets, hurtling toward them.

Returning from an absence of several days toward late summer, the children informed us that Pete was missing. "And Molly is feeding him," they asserted, "somewhere up the lake shore." Next morning we found the big fellow in the sand dunes a mile from home, wounded by fine shot. His wing was injured and one of his legs was broken. He could neither fly nor walk.

Pete discovered our presence before we saw him, and screamed a plaintive call for help. The protective red band he wore was blotched with blood where a pellet had grazed his neck. Removing him to the back yard, we placed his leg in a cast and dug three flattened shot from his wing.

Shortly after this Pete was returned to his place of disablement on the sand dunes so that we could make a photographic record of Molly feeding him. One day we filmed her leaving the yard perch with a herring, and the next day obtained a picture as she came down to Pete in the dunes with a fish the children had served her in the yard.

With Pete's convalescence, during which Molly would sit by him for hours in obvious solicitude, we selected a location for motion pictures where big shore pines overlooked dunes and waves. High-posed scenes in the dune pines invited impudent king birds to plague the mighty eagles. They would park on the great black backs, peck at the angry heads, and hold their place as passengers when the distracted eagles would drop from their perch in an effort to dislodge them. On one occasion, Molly, dancing madly to rid herself of the king birds, waltzed to the base of a red pine and began to climb. Gripping the bark in frenzy, and with amazing steps which held her body, leg-length, parallel with the trunk, she ascended forty feet.

On the day of Molly's fantastic tree climbing stunt, an accredited gallery witnessed a startling contrast. The eagles fiercely enacted the kill of an intruding night heron, turning the next moment to group in gentle tableau with their children chums. The camera had but to swing on its fixed tripod to register both scenes.

Shortly afterwards, the children announced that the eagles were to pose as national emblems. It had been discovered in play that an energetic waving of

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brush and small flags, attended by shouting, would stimulate an attitude of fighting ardor in the birds. This was done when the eagles were posed and the camera registered an image personifying defiant freedom.

"Your eagles have met a pair of young wild ones and the four tryst daily on an old stub near my cottage," came a report from a nearby inland lake. "The wild ones are growing tame and your tame ones are growing wild."

This information seemed verified when we returned home one day to find four eagles on the ridge of our house. Pete and Molly had evidently invited their wild friends to dinner, according to Jean. The eagles sat in a close row on the ridge facing the feeding perch, unmindful of the stream of noisy traffic on an adjacent highway.

The hosts, with what appeared to be polite repression, according to Margaret, allowed the wild male to take the first herring placed on the yard perch. A move to set up the camera caused alarm, and the four flew away screaming.

That was our last view of Pete alive. We found his body, battered with shot, on the shore of the inland lake, beneath the trysting stub where he and Molly were wont to meet the wild eagle pair. Rumor had it that an irate hunter shot him in reprisal for his theft of a wounded duck. The body was brought home and laid in state by the children, after removal of the talon claws for tokens.

Next day an unusual throng gathered at our highway-fronting door to see Pete's funeral. The body, draped in a silken flag, lay canopied in a child's trundle carriage, encircled by a wreath of pine. All the neighborhood children had come with their little wagons and buggies and go-carts, bedecked with wild flowers. The cortege moved in solemnity to the Lake Huron shore, where Pete's grave had been dug in the glistening sands. A month later the mound was covered by December snow.

Some years have passed since Molly left us on Pete's funeral day. She returned a year later for a brief survey of the yard, perching on the old feeding stub which still stands. Had her visit been two days earlier it would have marked the anniversary of Pete's interment.

No longer tots, the children still talk affectionately of their erstwhile playmates. They have it that Molly mated in the wilds with the same handsome young male she once brought to our roof-ridge. Anglers on regional streams have told in successive seasons of the temerity of an immense eagle that in perched proximity inspects their casts of dun or hackle, tensing betimes as if to intercept the fly-lured trout on its way to landing net.

Even yet, on special days, when the Stars and Stripes waves from the community's lofty municipal staff, the silvery crest of a great bird may sometimes be seen as it glistens in majestic swerve, far above, in seeming salute to the flag. The townsfolk of Oscoda claim it is Molly.

NEW PRODUCTS FROM REDWOOD

(*Continued from page* 318)

gether with planing mill wastes, the sawdust is also compressed into "logs" for use in your fireplace. Pacific Coast redwood lumbermen are not permitting a single bit of their product go to waste nowadays.

Latest redwood wrinkle is Patent No. 2,266,907, issued to a Boston inventor, Harmon B. Reihl, and assigned to the Pacific Lumber Company of San Francisco. Balls of felted redwood fibre were discovered in the bark shredding machines, and they led the inventor to experiment in producing a fabric "wool" from redwood bark. It can be used in blankets and clothing—in fact, its possibilities are limitless. Cloth can be produced with as much as sixty per cent less wool than heretofore required without materially affecting the qualities of the final product. The short, kinky redwood fibres blend readily with sheep's wool, and can be handled, napped, and brushed.

Separated by a machine, these short fibres are blended with natural wool and the mixture is carded, combed, and spun into yarns which can be woven or knitted. It takes an expert to tell the resulting fabrics from pure wool textiles, for the redwood fibres inter-mat and inter-felt with the wool to form a strong and fluffy cloth having properties similar to pure wool textiles, yet lighter in weight and lower in cost.

The redwood is as American as the wild turkey. It is also among the largest and oldest trees on the face of the earth. Because of this, the outstanding groves have been preserved so that generation upon generation of Americans can enjoy and be stimulated by their great beauty and majesty. At the same time, the large tracts of commercial redwood forests are contributing to the material needs of the nation, for redwood lumber has long been extremely valuable as a building material. Now, when it is needed most, its bark is preserving refrigerated food and saving fuel. And there is promise that redwood bark will help clothe many Americans with "woolen" fabrics no more expensive than cotton. Redwood, a one hundred per cent American, is serving America in new ways.

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